NATURE MAGAZINE

JUNE 1924

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JUNE

June days are astir with the activities of little out-of-doors creatures. All nature seems busy with the duties of every-day life.

Bumble bees are buzzing among the clover blossoms and the humming of insect wings fills the air.

Daisy fields are gay with butterflies of many colors.

Wild Roses make a fairy bower of the tangled thicket.

What an unexpected pleasure it is to find a Showy Lady's Slipper in the bog or wet meadow.

The Larkspurs in the garden are as blue as the sky above.

Wild Strawberries, ripened by June's warm sunshine, are sweet and luscious.

The Willows are "shedding cotton."

The perfume of Locust blossoms fills the air with a sweet, heavy fragrance.

Catalpas, too, are laden with clusters of sweet-smelling white blossoms.

Cat-tails are clothed in a fringe of olive-yellow blossoms.

By this time most of the transient visitants among the birds have passed northward.

June is home month for birds. Their days are occupied with such activities as nest-building, egg-laying, incubating, and the care of their young.

Kingfishers are laying their eggs in their tunnel-like nests.

The plumage of baby Baltimore Orioles resembles that of their mother in color. Their hunger cry is incessant now.

Even the hairiest of hairy caterpillars is consumed with apparent relish and enjoyment by the Orioles.

Purple Grackles and Robins gather in flocks to roost for the night. Here may be found the now fully grown young and their parents.

Young Meadowlarks will be able to take care of themselves by haying time in July.

The beams in the barn are lined with the cup-like nests of Barn Swallows.

Humming-birds rid the flowers of such pilferers as small beetles, ants, and flies who take but do not give in return.

From the cocoon which the Wooly Bear spun about him in April or May, there now emerges the Isabella Tiger Moth.

Leaf-miners have begun their destructive tunneling in the foliage.

Stagnant waters are alive with the wrigglers of the mosquito.

At the bottom of the pond newly hatched tadpoles are freeing themselves from the jelly-like mass which protected them and swimming away.

The White Crab Spider assumes the color of the flower in which he has taken up his abode and thus enjoys its protection.

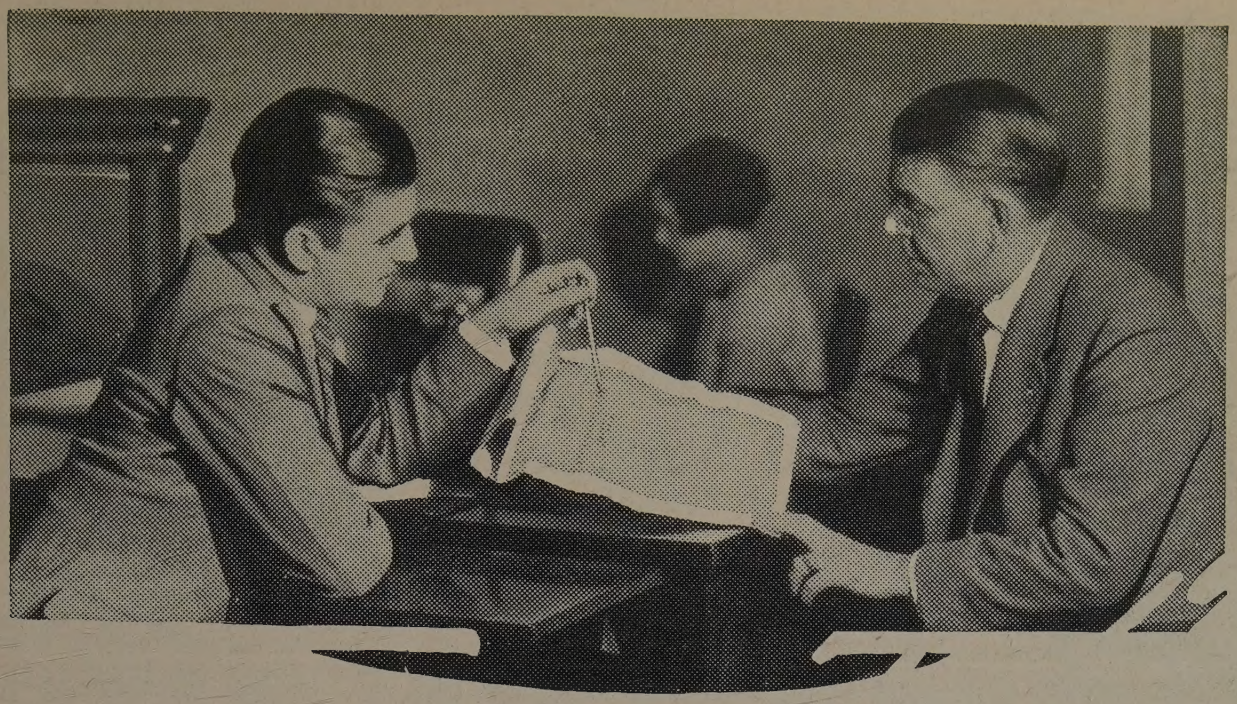
Partridges are raising families of young.

Many an unfortunate insect has met his "Waterloo" within the treacherous cavern of the Pitcher-plant, for once he enters his fate is sealed.

Promethea moths are leaving their winter quarters.

Up in the far north, the male seal, or bull, as he is called, is gathering his harem about him, jealously guarding each newly acquired mate.

Prepared for NATURE MAGAZINE by the Cleveland Museum of Natural History



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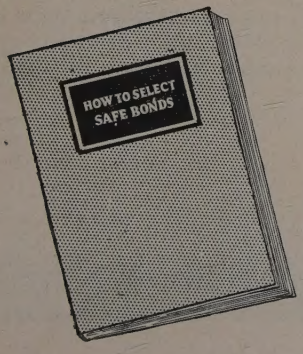

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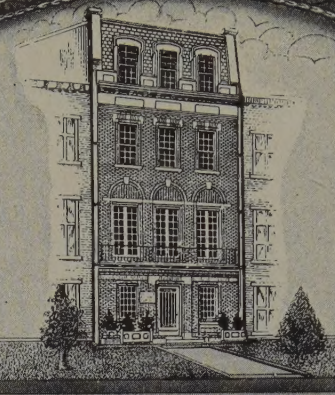

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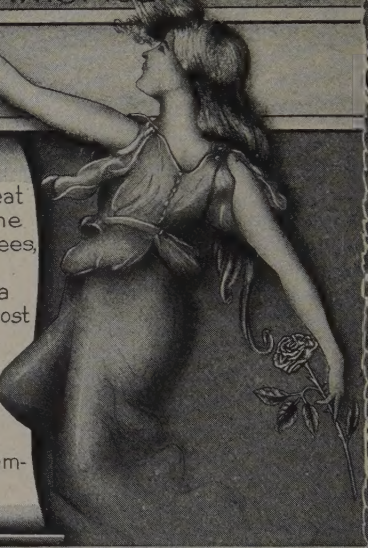

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Nature Magazine

An Illustrated Monthly With Popular Articles About Nature

Percival Sheldon Ridsdale, *Managing Editor*

Arthur Newton Pack, *Associate Editor*

25 Cents A Copy

JUNE, 1924

Vol. 3 No. 6

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A BIG BUCK CAME OUT OF THE WOODS

For a brief moment he stood curiously watching the blind but dashed away in affright when he heard the click of the camera shutter.

NATURE MAGAZINE

Vol. III JUNE, 1924 No. 6

It is Nature's sights and sounds and fragrances put together that convince us of our immortality.—THOREAU.

Taking Pictures of Moose and Deer

By CHARLES M. WHITNEY, M.D.

(Photographs by the author)

FOR ANYONE to enjoy the pastime of game photography, it is essential that he shall feel the lure of the woods, the enjoyment of the vast spaces, and be in harmony with his surroundings, the silent forest, and the big and little people that live in it.

The mere taking of a picture of an animal is nothing, for any park will afford an opportunity to do this, but the pleasure lies in the effort to get within thirty or forty feet of a wild and watchful animal protected by a keen sense of smell, acute hearing, and moderately keen sight.

It is necessary to go where deer or moose are numerous to have any chance of getting a good collection of pictures, and this means that each year one must go farther and farther afield. In New England, for instance, the numerous dams constructed by paper companies have so raised the

CURIOSITY CAUSED THIS BUCK TO VIEW THE AUTHOR'S CAMP

Unlike many others, when once frightened away he returned and approached within a short distance with a most inquiring look in his eyes.

TWO BUCKS ALARMED BY A SOUND

Each is in an attitude for immediate flight if they discover the sound they heard indicates the presence of an enemy.

water along the shores of streams and lakes that the feeding grounds have been destroyed and the animals go elsewhere, and there we must follow them.

There are several places in Maine where there are many deer and in New Brunswick moose are to be found in large numbers, and each year more and more deer are to be seen. In Ontario moose are plentiful, but the deep rivers and lakes are not favorable for photographing them.

To have a successful trip, it is best to take a camping outfit so that one can camp in the most favorable places. In Maine the trip is made in canoes with comparatively few carries, but in New Brunswick it is necessary to go by road, twenty-five or thirty miles, before reaching the ponds or streams. The canoes and supplies are hauled in by a team and the sportsman can go in quite comfortably on horseback over these long woods roads.

The only way to get good deer pictures is from a blind, for the deer are so alert that they cannot be approached in a canoe, except when one comes on them around a bend in a stream; but this happens so seldom, we can disregard it.

In making a blind, do as little as possible in the way of changing the natural surroundings. Take advantage of an uprooted cedar or a bunch of bushes, otherwise the deer will notice any new cuttings and keep away.

As the prevailing winds in the summer are westerly, the blind should be on the shore facing that direction, and the light will also be right until early afternoon.

It is most important to obtain a guide who will enter into the spirit of the sport, and I have been most fortunate in having with me for many years my friend, companion, and guide, Seely Bowser, whose interest, patience and good judgment have added much to my success.

Having selected favorable locations for one or more blinds, the next step is to clear a space be-

A YOUNG "CALICO" BUCK

Note his coloration which earns him his name. He posed for a second and then bounded into the woods.

hind each, so that one can move about. Every little dry branch should be removed, for, if stepped upon, it snaps, and the very acute hearing of the deer gives it warning that something is wrong and away it runs and the picture is lost.

We are now ready for the day's entertainment, and this depends absolutely upon the number of deer that can be seen near or far away. If they are numerous, it is fair to assume that some of them may approach the blind, but to be in a place where hour after hour goes by without the sight of an animal would bore one to death.

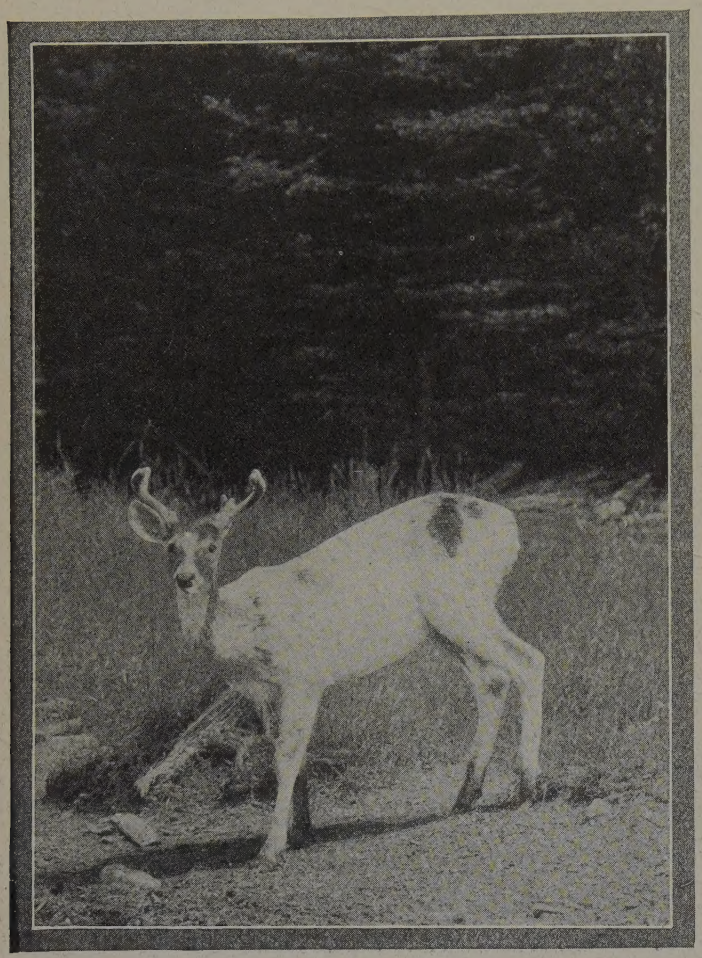
In our safe hiding place we are able to see just how these animals behave when undisturbed. We see what an alert and timid animal the deer is, for when it comes out of the woods, it looks this way and that, and stands listening to see if any foe is approaching. Then it walks along the shore feeding on the tender water grass or lily pads which are blown in from the pond, but every few seconds it lifts its head and looks and listens, ever watchful, ever vigilant. Now and then it will stand still and look intently toward the woods, often raising one of its forefeet, and if you know its ways, you will suspect another deer is coming out, although not a sound is heard. Sure enough, in a short time a deer steps out and the first one resumes its feeding.

AT THE MOMENT OF ALARM

The cow moose feeding in the lake heard a strange sound and the little baby moose at once ran behind its mother for protection.

They are especially timid in a high wind and will jump in alarm at the sound of the waves splashing on the rocks. They are very sensitive to sudden changes of temperature, and it is most surprising to find none coming out of the woods when a cold northwest wind blows.

Their sense of smell is wonderful, and I have seen a deer get the scent a half mile away and a moose, on one occasion, over a mile, with the wind blowing directly toward it. Hence it is that the



A WHITE BUCK

These are seldom seen and good fortune secured this picture of an alert one.

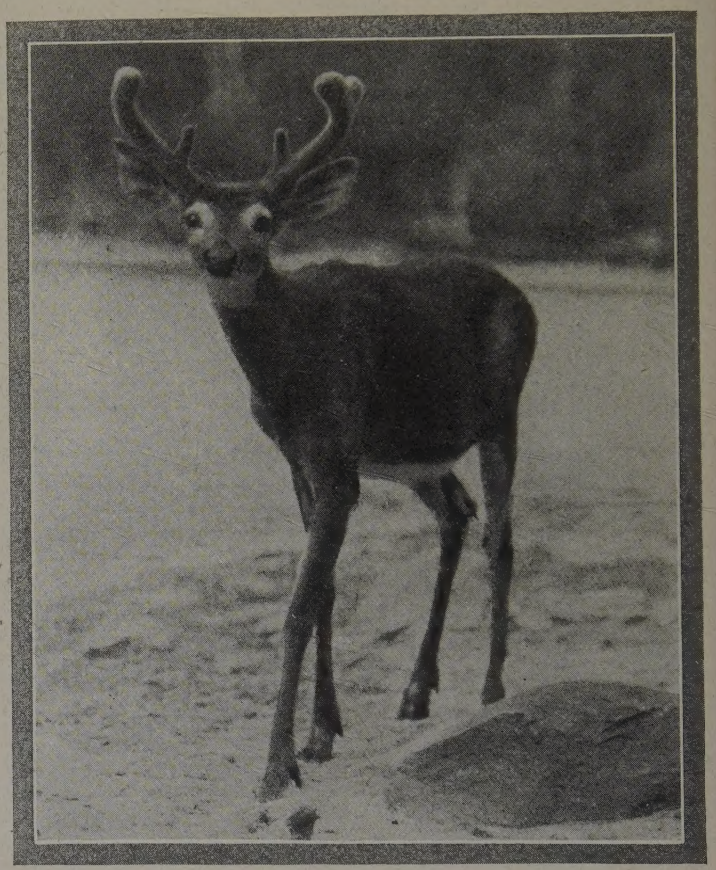
first thing that the photographer does in the morning is to see which way the wind is. Sometimes it is deceptive, for the clouds may be going two ways, but it is fairly safe to depend upon the upper high clouds. If the wind blows wrong, stay in camp because you will see no animals.

When the deer gets a strong scent near by, it jumps in a panic for the shelter of the woods, but when far away, it puts its nose in the air and sniffs and sniffs, often bobbing its head and stamping its foot in anger because it cannot locate the direction of the enemy.

When one can see no deer, it is a great temptation to move about behind the blind, but this is a mistake, for on many occasions I have seen a deer stand perfectly motionless well back among the trees for fifteen minutes, waiting to see if the coast is clear. Therefore, if you move about, it sees you and goes back.

As we sit quietly watching, we see a doe walk out from the woods, not far away, followed by two little spotted fawns and a yearling still following its mother. She walks into the water and noses about, while on the shore the fawns play, running back and forth, jumping over each other, tumbling down, and then up again to bother their older sister. Meantime the mother placidly feeds, paying no attention to the frolics of her children.

While we are watching this scene with interest, knowing that it is too far away to photograph, we suddenly get a start, for within fifty feet of us, without a sound, not a twig cracking or a bush moving, out steps a buck with big horns. He looks about and, unsuspicious, walks toward us,



OUT FROM WOODS TO LAKE SHORE

Dainty buck on his way into the water to feed on tender vegetation near the shore.

and within twenty-five feet of us he raises his head in good pose. Snap goes the camera and we are repaid for our wait. When the shutter snaps, he gives a frantic jump and makes for the woods. The mother doe looks up in surprise and she, too, runs for the protecting shelter of the woods followed by her little family. Then quiet reigns and we can walk about till things start again.

One can have no end of fun watching the deer, for they are so pretty and graceful. They are tricky also, for sometimes you see one walking

stiff-legged along the shore, with almost a limp, and you say to yourself that it is such a pity that the poor animal has been hurt. Then something startles it and away it runs with no sign of lameness. Just one of its little tricks, that's all.

On one occasion we made our blind on the edge of a clearing among the firs where there were many deer, and one bright sunny morning a big buck walked into it and came within thirty feet of us. As the camera snapped he gave a little jump, looked around, and resumed his feeding. After a little while he came nearer and another picture was taken, and this time he very leisurely walked into the woods.

We were talking over our good luck in getting so close a picture when Seely happened to look back and there stood the buck about thirty feet behind the blind calmly looking us over, for all the world as if he were saying, "Ha! ha! I see you now. You can't fool me." It was so funny that we had to burst out laughing at him. He came back again on other days, and we called him Alfred to make him a member of our photographic family, and I sincerely hope that he is still unhurt, for he was most friendly and interesting.

THIS LITTLE DOE BECAME QUITE FRIENDLY

She grew to like doughnuts and beans and after a time was bold enough to approach within fifteen feet of the author for them.

When you cannot take pictures on account of rainy or cloudy weather, you may often see deer coming to the camp ground to see who has arrived.

There was a little doe up the North Branch one summer that would come out and watch us from a safe distance, running away if we moved in her direction. By leaving some potato peelings and cookies where she came out, I was able, before we left, to get within seventy-five feet of her and

to toss pieces of doughnut to her without startling her. The next summer I went there again and we had not been in the place an hour before she appeared. Not being sure that she was the same doe, I took some pieces of doughnut and called to her. At once she came nearer and ate the food and waited for more, and I know she was my old friend. In ten days I had obtained her confidence so much that she would come within fifteen feet and eat beans and fish from a plate beside our outdoor table.

One morning Seely said, when observing she was a nursing doe, "Bring your little baby tomorrow and we will give you lots of grub." The very next morning, by a curious chance, out she came and tagging at her heels was a little spotted fawn no bigger than a pint of cider. It, however, did not share its mother's confidence in us and ran away to the woods.

We left her most regretfully at the end of the trip, but had some later news of her. Seely happened to meet another guide who had taken a party to that locality and asked him if he saw our tame doe.

"We certainly did," he replied. "The first night we camped we left

FEEDING BUT EVER WATCHFUL

The deer love the lily pads and tender vegetable growth along the shores of lakes and streams.

A COW MOOSE FEEDING IN A LAKE

While the moose, especially the females, are far from handsome or graceful, their great bulk make them quite an impressive sight.

all our stuff on the table and the next morning all our salt was gone and everything else was upset in all directions. After that time she was all over the place and into everything. I'll say she was a darn nuisance, if you ask me."

Moose are slower in motion than the deer and do not take such pretty poses, but they are so big and impressive that taking their pictures at close range is very exciting. The best method of getting a picture is to hide behind a blind or to bring the canoe close to the shore and wait for them to feed up to it. A big bull moose, with a four or a five feet spread of horns is a sight well worth seeing.

DOES IN A SCRAP

Such fights are not infrequent, but rarely is the photographer lucky enough to get a picture of one.

As an example of the unexpected I had a most interesting and at times exciting experience in New Brunswick. Seely and I were waiting in the canoe to see what would come out when we saw, up the dead water, a cow and calf moose gradually feeding

(Continued on page 376)

TWO DOES AND A BUCK

This little family party approached close enough to the blind to have a good photograph taken. Note the alert attitude of the buck.

Drawing by Bess Bruce Cleaveland

THE CONDEMNED

Friends or Enemies?

WHAT are vermin? Which are predatory animals? What steps should be taken, if any, against marauding members of the bird and animal world, and who is to dictate these steps?

These are some of the questions brought up by the action of the E. I. du Pont de Nemours and Company in conducting a campaign for the killing of the crow blackbird and seventeen other species of birds and animals. This program is in the form of a contest conducted through local dealers in firearms and ammunition. It is open to any citizen of the United States and Canada.

The entrants will make their kill, submitting to the local dealer, as evidence, heads of crows, tails of weasels, hedgehogs, woodchucks, hunting house cats and red squirrels, and the heads of all other species included in the company's vermin list of eighteen. Points will be credited to the contestant ranging from one point for every crow and several others on the list to 25 points for a bobcat. Prizes amounting to $2,500 in merchandise will be awarded to individuals and teams with the highest scores.

The powder company has apparently made a study of the question and concluded that the animals on its list are vermin. It advocates the promotion of Vermin Hunting Clubs and suggests the creation of Vermin Hunting Week. An elaborate advertising campaign has been worked out designed to bring about concerted action against the vermin in the interests of the farmer and the sportsman. Incidentally the campaign will stimulate the market for shells.

There has arisen, however, a wide disagreement among experts about this campaign of the du Pont Company. Officials of the United States Department of Agriculture asserts that certain of the birds listed should not be widely killed. At the same time they agree that some of the birds and animals are predatory and could be classified as vermin. There is disagreement, as well, among the officials of the various states, and between state laws relating to game and firearms.

To discover the exact situation, the American Nature Association has been in communication with the Attorneys General of the states or the Fish and Game Departments. The laws relating to the open carrying of firearms range from strict prohibition, except during the hunting season, to no restriction at all. The laws and opinions with regard to the "vermin list" vary as widely.

The Department of Game and Inland Fisheries

Can You Decide?

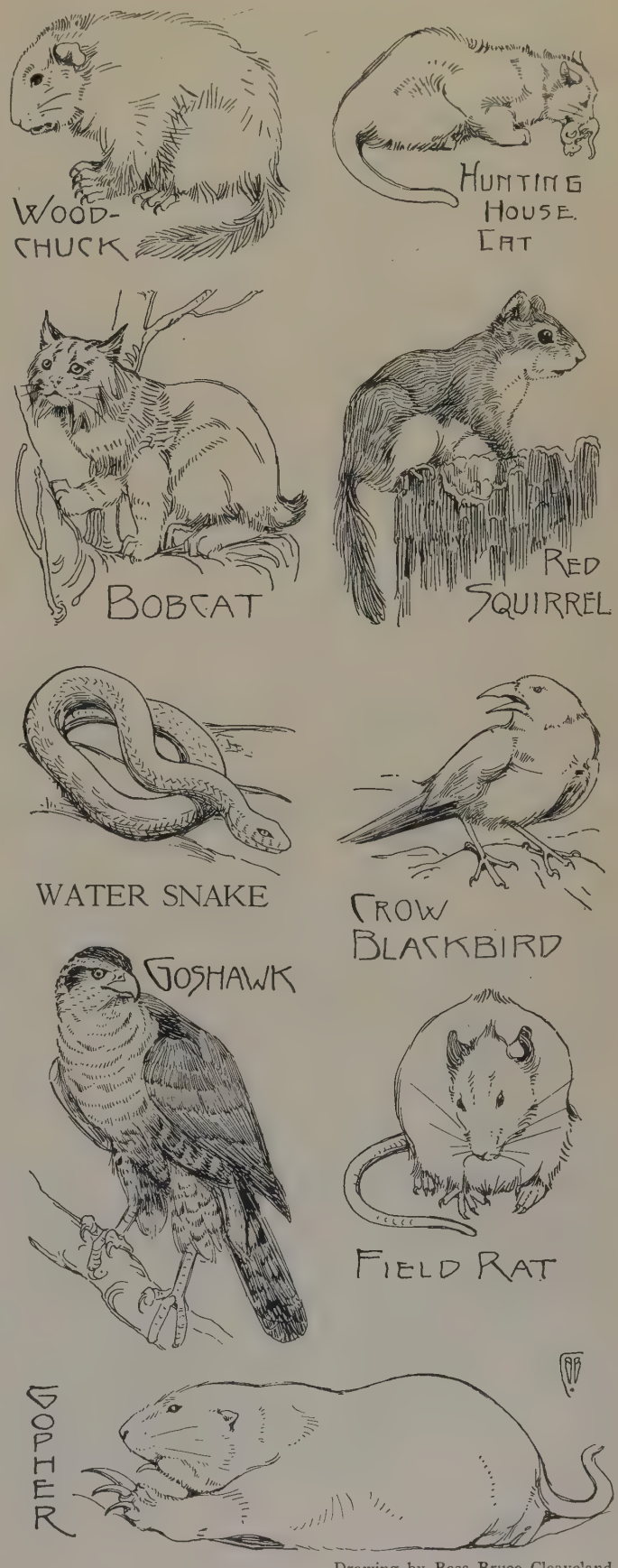
of Virginia, for example, had instituted a campaign for vermin control before the powder company took it up. It declares itself in sympathy with the control of predatory birds and animals. The following statement by the department is interesting in illustrating one viewpoint:

"We believe that the matter of vermin control in America has never heretofore received the proper attention, and that a control of the vermin which prey upon useful wild life and game birds and animals is just as necessary for their conservation as bag limits, hunting seasons and other restrictions in the interest of the hunted. We are not unmindful of the fact that some of the hawks and some of the owls are probably more beneficial than harmful. We do not believe it is possible, nor would we desire, to exterminate the crow or any other species of bird or animal; however, we do believe that by greatly reducing the number of predatory birds and animals we can effect a great saving in useful wild life.

"We find, so to speak, two schools of thought in this matter—one headed and dominated by ultra theorists and scientists; the other by the dead practical man, who has no vision and often walks over a precipice before he sees it. We believe there is a middle ground upon which practical wild life conservationists should travel, and, so far as we can, we propose to do this."

On the other hand, there is the attitude of Massachusetts. Of the birds on the vermin list of the du Pont Company, all except the kingfisher are unprotected and may be killed by licensed hunters at any time. The kingfisher can only be killed when doing damage at trout hatcheries. The Chief Fish and Game Warden states, however, "that this department has gone on record publicly as being opposed to this 'Crow Campaign,' and our wardens report that there is practically no activity along that line in this state."

Pennsylvania has taken a similar stand in opposition to the powder company's campaign. Other state officials have endorsed its general intent. Ohio's laws prohibit the taking of turtles by shooting, but provide that nothing in the law shall prohibit the killing of the chicken hawk, blue hawk, Cooper hawk, sharp-shinned hawk, crown great-horned owl or English sparrow. Authorization of bounties by township trustees for killing these birds and the American goshawk and duck hawk is provided by law. The other animals on the vermin list are not mentioned in the game code of Ohio.



Drawing by Bess Bruce Cleaveland

THE CONDEMNED

Indiana has a closed season for the killing of squirrels, including the red squirrel, and no special inducement to kill the other birds and animals on the list. Tennessee protects only the woodchuck, and the Game Warden states that "it has always been permissible in this state to kill owls, weasels, crows, blackbirds and hawks. To the quail they are a deadly enemy." North Carolina partially protects the starling, kingfisher, crow, blackbird and the red squirrel. In New Hampshire there is a bounty for wild cats, including bobcats.

This variation is found in other of the state laws. It encourages arrival at a definite knowledge and understanding. To this and the best study and opinion should be devoted. If these birds and animals should be controlled, well and good. There is reason to doubt, however, whether it is exactly the duty of a powder company, which necessarily must have a commercial interest, to say the final word.

Beyond these considerations there are questions of greater importance. They are questions of principle and practice. One effect of this campaign will be to loose in the fields and woods, outside of the hunting season, thousands with guns on their shoulders ready to shoot and find out what they shot afterward. It will immeasurably increase the usual hunting season hazards to the tramper, the picnicker and the passing automobilist from the stray and ill-directed shot. And how many who would enter such a contest merely to kill or to win prizes could be trusted to spare game or harmless species provided no "vermin" present themselves?

It is difficult even for the naturalist to distinguish the different species of hawks on the wing at gunshot range. For every 40 turtles killed, perhaps only one will be a snapping turtle. The innocent pussy cat roaming in the woodlot or field is likely to lose all of its nine lives, for who can tell by the tail of a cat, submitted as evidence, whether it was hunting birds or a saucer of milk? The kingfisher, because Nature endowed him with an appetite for fish, usually minnows, may suffer because he poaches on the sportsmen's preserves.

Nature struck a balance in the wild life world. It created friends and enemies, protectors and attackers, conservatives and liberals in an instinctive existence of wild winged and furred beings. There is danger in attempting to change that balance except upon the most final of evidence. Danger lurks as well in the authority given the local dealer to determine whether the evidence submitted by contestants is really what it is represented to be. Valuable members of the bird or animal world may be killed and add points to the score of the contest shooter.

The American Nature Association stands definitely in favor of clean sportsmanship, in season, properly restricted and with proper penalties for its abuse. The evidence today, however, is too indefinite and opinions too varied to grant to a powder company authority to declare open war upon any group of animals.

HOW CAN THE SHOOTER DISTINGUISH THE ONE OF THESE FOUR WHICH IS CONDEMNED?

The first is the Red Shouldered Hawk, the second the Red Tailed Hawk, the third Cooper's Hawk—the only one of the four condemned—and the fourth is the American Rough Legged Hawk.

Yankee Doodle-Dude

Dude Ranches, Dude Wranglers, Dudes and Out-of-Door Delights

By ARTHUR NEWTON PACK and ELEANOR PACK

"YANKEE DOODLE came from town riding on a pony." Thus sang the newest "dude" of the outfit—at home, aged 30, a T. B. M.—but now mounted in the safe comfort of a western tall-horned saddle, upon a western pony which trailed along in the single file of real cowboys and fellow sojourners at the ranch. Once upon a time, so the movies assure us, the tenderfoot from the east would have had rather different treatment. If he was not forced to dance to the tune of six-shooters, at least the "bad actor" horse would have been permitted to throw him over the gate of the corral. Those were the days of cattle punchers, cattle thieves and cattle kings, the days of the open range, of glory and mostly fictitious gore, before the census bureau of Washington stopped listing ranchmen as ranchmen and called them farmers, before the last great trail herd withdrew before the onslaught of Henry Ford.

Where are you going this summer? Out-of-doors—out to a ranch as a paying guest; only they won't call you that. You'll be a "dude." That's not a term of opprobrium; it's the name the west gives to any man or woman, usually a person from some other part of the country, who hires even a single guide. The cowboy who is responsible for the horses of any outfit is a "horse wrangler"; the man who is responsible for the care of dudes is a "dude wrangler." Dude wrangling is a business, calling for the combined talents of a real rancher, a hotel manager, a born entertainer, a naturalist and a father confessor. But the dude—ah, that is a different matter. Long days on horseback in the open, streams to fish with real fish ready to be caught, real mountains painted by sunrise and sunset in glorious colors, cool and bosky canyons to rest in, perhaps with glimpses of the wild folk both great and small—these all are there for the asking. Then comes evening at the ranchhouse with tales of the old west, and plans for the Frontier Day which is to be the crowning event of the season. On that day come cowboys from other ranches eager to carry off the prize, often not so much for themselves but for their loyalty to the "outfit" they represent, for this is a tradition and an interwoven bit of the character of the old west.

WHILE THE "DUDES" LOOK ON

Above.—A thrilling moment of Frontier Day on the ranch.

Below.—A few of the great number of horses needed to carry the visiting horseback tourists on a trip none of them will ever forget.

Perhaps you have seen a rodeo, now an annual feature at Madison Square Garden in New York; perhaps you have been more fortunate in having witnessed the great gathering at Pendleton, Oreg., or elsewhere in the real background of the west. But there is none so thrilling or exciting as that in which Ed and Harry, with whom you have ridden all summer, compete against their rivals, while you shout "Ride 'em, cowboy" with all the power in your lungs. You know that horse; that's "White An-

gel," the old boy with wicked eye. You've seen Bill practising that trick of roping five horses abreast. Can he do it now! "Ride 'em, cowboy, ride 'em, ride 'em!"

BLACKFEET INDIANS

A horseback trip through Glacier National Park is frequently conducted by the "Dude Wrangler" for the education and entertainment of his party. Here beneath Rising Wolf Mountain the Blackfeet tribe often assembles.

Here at home I go for a ride in the park, posting regularly to the trot, on a saddle which the cowboy calls a "postage stamp," and over and over in my mind recurs the phrase I wrote in my first copy book, "The horse is an intelligent animal." But what would become of this horse of mine on a wild gallop across the stony mountainside interspersed with gopher holes. The western horse will and can do it; he can cross with perfect safety many a place where a man on foot would stumble and fall. Up the steep trail and down the mountainside he picks his sure-footed way, carrying alike the experienced cowboy or the girl from Chicago who has never ridden before in all her life. Trained horses, under the watchful eye of the ever-present cowboys, await the tenderfoot dude, and if he is tender elsewhere after the first ride or two, persistence and encouragement will soon strengthen tired muscles. The outdoor air and closeness to Nature will soon clear the brain, fogged over in its finest perceptions by months of indoor life and physical indolence.

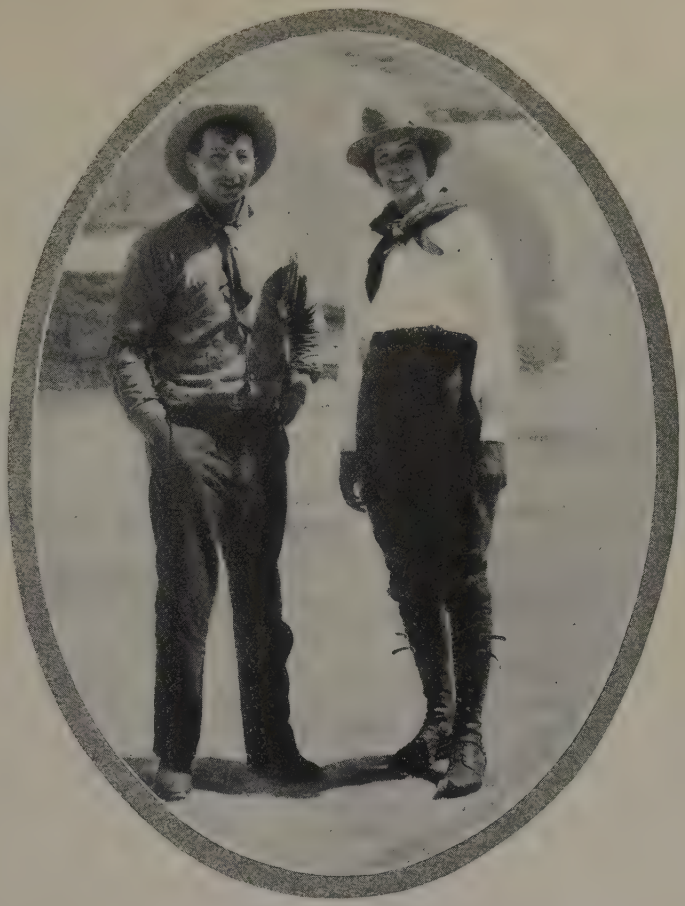
That wonderful day when Bill first encouraged me to try and saddle the horse I was to ride! My first successful business venture gave me no greater thrill. The seven-day pack trip up into the mountains when I first tried to throw a "diamond hitch" seemed to mark an epoch. Eyes that have missed the lore of nature learn on the ranch the fundamentals of observation which meant life itself to the contemporaries of Jim Bridger. Have other men and horses passed this way? Have cattle wandered up yonder canyon? Only years of training produce the sharp, all-seeing glance of the real frontiersman, but the veriest tenderfoot will find his perceptions much improved in a single summer.

ALL THE PARAPHERNALIA OF PLEASURE

What more do you need than a simply packed kit and a tent of tepee architecture to feel for yourself the thrill of the frontiersman. It's great fun to be a "Dude."

The pretty young girl from the east and the handsome bronzed cowboy — put them together in the movies and you have romance. The girl from college on her first moonlight ride remembers the tales she has seen and read and is thrilled with flirtations

to come. Next day, however, she learns that the wise "dude wrangler," her host, has taken care of even so small a point as this, that he makes a point of having handsome cowboys, but picks them married, and even perhaps with a jealous wife in the outfit to see that they behave. Dude wrangling is no mushroom business grown up overnight without forethought. There are sleeping cabins, often built of logs, but equipped with fireplaces to ward off the chill of western nights and mountain dawns, a selected crew of help to tend the fires and make the beds, blankets always in abundance, and probably even the luxury of clean cotton sheets. There is the cookhouse, presided over by no mean cook and complement of cookees, its shelves well lined with vegetables which could never have been grown in the short season of that high altitude. A country which raises meat is ever known for the paucity and poor quality of its beef and lamb, so that the management must procure regular shipments from the packers at Chicago and Kansas City. All this is besides the maintenance of a string of horses for the dudes and their cowboy attendants, horses enough to permit a continual fresh supply, horses for the work about the ranch, horses for the "chuck wagons," supply teams, and regular stage service between ranch and probably distant town.

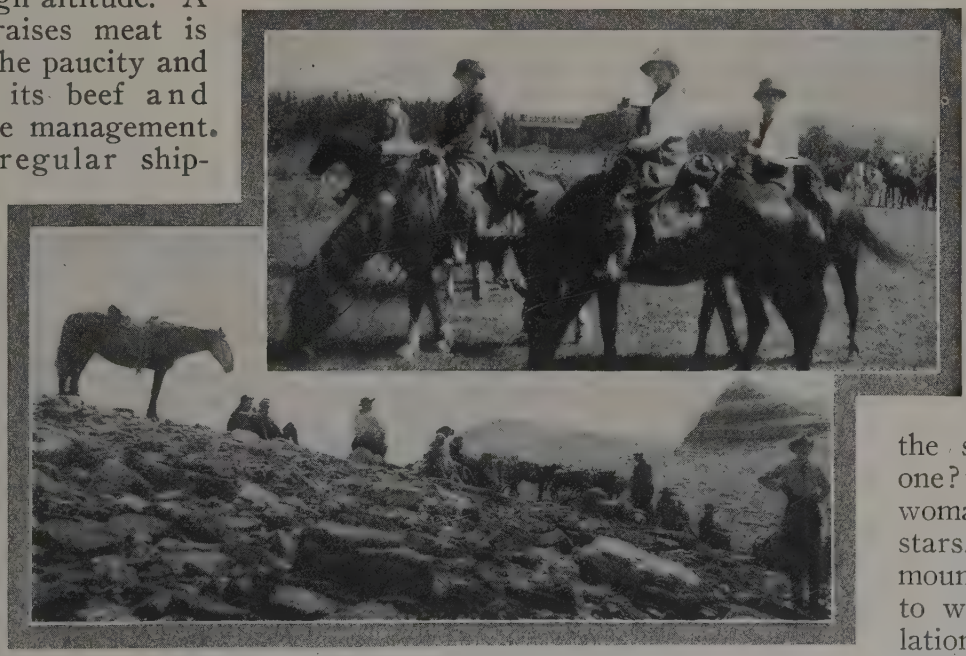


THE COWBOY AND THE GIRL

The Dude ranch is no haven of moving picture romance, but it does offer an opportunity to be well guided amid the splendid intricacies of Nature's Wonderland.

The "dude wrangler" is the conservationist of the new west. The presence of a small herd of antelope on his domains may mean the loss of forage for cattle and horses, but it means also an added attraction for his visitors. He may be a hunter, but when the deep winter snows upon mountains of the National Parks cause the great herds of elk to drift downward toward the valleys outside the park limits, he it is who stands against wholesale slaughter with a realization that the maintenance of clean sport requires protection of the game.

His is the responsibility for seeing that his visitors are constructively entertained, and yet he must not seem to direct. The book of mountain wildflowers on the ranchhouse table suggests a trip to the multicolored upper meadows. How is it that some member of the party can so often point out the plants by name and tell the stories of each one? This man or woman knows the stars. We ride to the mountain top at dusk to watch the constellations appear, and someone tells us the names of many. Yonder whistle—what was



IN PRAISE OF THE WESTERN HORSE

It is on a ranch that we learn, perhaps for the first time, to appreciate the value and intelligence of the horse. He has made history the world over. He has founded and developed the Great West.

(Continued on page 376)

What Would We Do Without Sugar?

By CHARLES G. TUBBS

Of the American Sugar Refining Company

TODAY, as in the past, food provides one of the most important problems which mankind has to meet. There is a difference, however, in the method by which modern man approaches the problem. The cave man found a direct solution in sallying forth armed with a club. Society is different now. There are more mouths to be fed; the mouths are more discriminating. Life has become so complex that the individual no longer can give his time and his effort to producing or killing the food and meat that he eats. Vast industries have developed, the sole purpose of which is to satisfy the necessity for food and man's craving for sweetmeats.

Chief among industries of the latter class is that which gives us sugar, a favorite food of the American people. There was a time when sugar was a luxury. In the old colonial days it cost 75 cents a pound. Large scale production, however, has brought the commodity within the reach of everybody, and it is now a staple article of our diet. The United States consumes about 5,000,000 long tons of sugar a year. The story of how this product of the soil is provided in such a huge volume is one of the romances of industry.

The sugars of commerce are derived from sugar-cane and from sugar-beets. Sugar-beets will grow in different climates if the soil be favorable, but sugar-cane is a grass that requires the warmth of the tropics. The consequence is that much more beet than cane sugar is produced in continental United States. Our island possessions, on the other hand, being in a warm climate, produce sugar-cane exclusively. The following statistics of Willett & Gray show the relative importance of the two crops in what is known as "the United States field," comprising the regions upon which the country is dependent for its sugar supply, for 1922-23:

	Long tons
Cane:	
Cuba	3,602,910
Hawaii	469,000
Porto Rico	338,456
Philippines	264,000
Louisiana	263,478
Texas	2,875
Virgin Islands	1,739
Total cane	4,942,458
Beet:	
Continental United States	615,936

"BLOCKING" AND "THINNING" IN A FIELD OF GROWING SUGAR-BEETS

The men in the foreground are blocking, leaving a bunch of beets every eight inches. Those in the rear are thinning out the superfluous beetlets, leaving one in a place, eight inches apart.

Beet sugar is produced in seventeen states—Washington, California, Nevada, Utah, Idaho, Montana, Wyoming, Colorado, Nebraska, Kansas, Minnesota, Iowa, Wisconsin, Illinois, Michigan, Indiana and Ohio. Cane sugar comes mainly from Louisiana. Cane is grown also in Texas and Florida, and elsewhere throughout the south, but it is used in these states almost entirely for making syrup and molasses.

To look at the plants through which Nature

CARTING THE CANE FROM THE FIELD

The cane stalks are loaded into primitive carts which are drawn by oxen to the railroad station.

gives us sugar, one hardly would think that in these drab and uninviting beets or in these coarse and fibrous cane stalks, as much suggestive of food as a bamboo pole, there could be hidden one of the great solaces of life; yet from them comes the sweet juice that is the delight of a sugar-craving nation, that gives employment to hundreds of thousands of men and women, that brought the United States Government $97,000,000 tariff revenue in 1922, that cheered our armies in the World War, that makes possible the thousand and one delicacies which are so highly relished by every condition of men.

Sugar is a munificent gift of Nature. But it is a gift that is not to be had without human effort and industry. Therefore upon Nature's bounty has been built an immense agricultural, industrial and commercial organization for the purpose of raising sugar-cane and sugar-beets; of extracting from these products of the soil the sweet juice; of transforming it, in the case of cane, into raw sugar which in turn must be refined to provide the glistening white sugar for table use; and, in the case of beets, of manufacturing granulated sugar directly from the juice; then, lastly, for the purpose of marketing and distributing the sugar of commerce.

The production of cane sugar begins in the tropics. The first step in developing sugar land is to clear it of timber. The brush and creepers are fired. This burning does not clear the land entirely, and the charred stumps and logs are left to disintegrate under the warmth and moisture of a few wet seasons. It is not necessary to wait, however, in order to make the first planting, for the growth of the cane is so dense and rapid as effectually to kill any further development of underbrush.

Cane fields are planted with cuttings about a foot long, which contain two or three seed buds. The method of planting is necessarily primitive, owing to the rough character of the soil. One man drops the cuttings every three or four feet.

PLANTING SUGAR-CANE

From "cuttings"—sections of cane stalks about a foot long containing two or three seed buds—placed in the ground, sugar-cane crops spring annually for years.

He is followed by another man who, with a pick-ax, makes a hole in the ground into which he thrusts the cane cutting, tamping the earth above it with his feet. Vegetation grows so luxuriantly in the tropics that this simple method suffices to produce a plant with several shoots that soon form a clump or stool of cane. One planting on virgin soil is enough for ten or twelve years. New plants called "ratoons" spring up from the stubble after each harvesting.

The numerous stems of the cane plant resemble corn stalks in appearance and often attain a height of fifteen to eighteen feet. They are thick and unbranched, with broad, flat leaves three feet or more in length. The plant matures with the approach of the dry season.

When the cane is harvested the stalks must be cut by hand. Although many attempts have been made to produce a machine that will cut cane as

mechanical mowers cut grass, so far none has gone into general use. By means of the heavy knife, or machete, which is used, an expert workman in the field can cut and load six tons of cane a day. The stalks, after being stripped of their leaves, are loaded into ox carts. The leaves serve as fodder for the oxen. Within easy hauling distance from each field is located a railroad siding and loading station, and thither the creaking ox carts wend their way. There are cranes at these loading stations which in a single operation lift the full load from the cart and deposit it in the railroad car.

FOREST RESERVES FOR SUGAR BARRELS

These white pines are ten years old and are from ten to twelve feet high. They still have a quarter of a century to go before they can be cut!

At the central, as the sugar factory is called, there are tilting tables which make it possible by tipping the loaded cars to dump the cane directly upon a moving belt that conveys the stalks to the first rollers or crushers, These consist of two cylinders which crush the cane as it passes through. The cane is thus prepared for the next set of rollers.

Heavy horizontal steel cylinders exert a tremendous pressure on the sugar-cane; the cells of the plant are crushed and the juice squeezed out. Sprays of water facilitate the extraction of any remaining juice. The pulp that is left, known as bagasse, is conveyed to the boilers and provides the bulk of the fuel necessary to operate the mill. The sugar-cane juice, constituting about 80 per cent of the weight of the cane, is clarified by the addition of lime.

Concentration of the juice into syrup takes place next in the evaporators, and the syrup thus produced is granulated in vacuum pans—huge, closed tanks in which it is possible, by exhausting the air, to boil the sugar at a lower temperature than that required under normal atmospheric conditions. This is necessary to prevent caramelization or burning of the sugar, and, besides, it saves fuel. The sugar, which is still soft and damp, owing to the presence of molasses, goes to the centrifugal machines. These consist of large cylindrical baskets with screen sides. The basket is spun at the rate of about 1,100 revolutions per minute, and centrifugal force drives the molasses into an outer receptacle, leaving the sugar inside the basket.

A CANE FIELD IN THE TROPICS

The workmen cut the cane stalks near the base with heavy knives, or "machetes," and the cane is gathered, stacked on wagons and taken to the factory.

The sugar thus produced is known as raw centrifugal sugar. Packed in bags, it is ready for shipment to the nearest seaport, and thence it goes on its long water journey to the cane sugar refineries. The raw sugar goes directly to its destination without transshipment, for refineries are built on the water front and the ships that come from the tropics discharge their cargoes at the refinery dock. By means of a crane six or seven sacks at a time may be unloaded from the vessel in a sling. United States Government officials and representatives of the buyer and the seller weigh the sugar as it is unloaded and retain a sample of the contents of every sack before it is removed from the dock. Customs duty and purchase price are paid on the basis of a laboratory analysis of the samples.

CUTTING THE TABLETS

The sugar slabs, after being sawed into strips, are chopped, rather than cut, into tablets preserving the shape of the crystals.

The sacks are taken from the dock and emptied into the mingler, where revolve heavy spiked rollers that break up the large lumps in the raw sugar. "Mingling" is the first step in the treatment of the raw material. Syrup is mixed with the sugar, care being taken that too much is not added, as the sugar crystals would melt. The magma, as the pasty mixture is now called, is run into centrifugal machines to separate the syrup from the sugar crystals, which are left comparatively white and dry in the basket. Water is used to wash off any syrup which may cling to the crystals. Only five or six minutes are required to spin off and wash six hundred pounds of sugar. The products of this process are washed raw sugar and wash syrup. It is the latter that is mixed with the raw sugar when it first enters the refinery for the finishing processes.

The washed sugar is run into melting pans, huge cauldrons in which the sugar is melted in water heated to 180° F. The liquor is strained off, leaving behind any coarse particles of foreign matter which may have been in it up to this stage of the refining process.

The liquor next is heated in "blow-ups," or defecators, infusorial earth being added as a filtering medium. A double filtration process follows, first through fine cotton cloth and then through tanks of boneblack. The liquor, now thoroughly sterilized, comes from the char filters clear and sparkling like spring water. The pure liquid sugar runs into vacuum pans, where by the skilful manipulation of the operator crystals of any desired size are formed. The sugar in its crystallized state takes another trip through the centrifugals to rid the granules of the syrup surrounding them. From this process are obtained several grades of syrup for industrial and for table use.

THE SUGAR-BEET

Perhaps the most scientifically bred plant in the world, for on its breeding depends its ability to gather sugar from the air.

The process of granulation is now almost completed, but the sugar is damp. It is dried by means of warm air in long cylindrical revolving granulators, each with a capacity of about fifty barrels per hour. Following that the sugar is divided, by means of screens, into different classes, according to the size of grain desired. Endless belts convey the sugar to the packing house, where it is put into barrels, bags, sacks and cartons.

There are variants of this process to make cube and tablet sugar and the other special grades, such as old-fashioned brown, powdered and confection-

ers', but these we shall not trace, since granulated sugar constitutes the bulk of a refiner's production.

The cooperage operations necessary to supply all the barrels required by the refiner form in themselves an industry of large proportions. Forests, seed beds, transplant beds, lumber camps, railroads, stave and heading mills and cooperage plants are all indispensable if the refiner and the sugar manufacturer are to be assured of a steady supply of barrels for their product. The barrel factories owned and operated by The American Sugar Refining Company turn out 4,000,000 barrels annually. Extensive reforestation of cut-over timber land is carried on by the company, which has planted nearly 2,000,000 trees in the forests of the Adirondacks. There are, in addition, 1,200,000 trees in the seed beds and the transplant beds. The standing hardwood timber on the company's lands in 1922 was estimated to total approximately 1,097,550,000 feet.

Reforestation is slow work that demands great care. It is really a service to posterity, since the benefits of today's labor come to future generations.

The replenishment of our timber supply commences in the seed beds, where the seeds are protected for two years until a diminutive tree a couple of inches in height has grown. This is carefully removed to a nursery to pass another two years. After four years of life the tree is six or eight inches high and has roots probably half a foot in length. Watched over and nourished all this time, the young tree has been fitted for its long life in the forest, and there it is now planted. There it spends thirty-five to forty years, growing at a snail's pace into a patriarch, measuring as many feet in circumference as it did inches in height when first placed there.

In the United States the manufacture of beet sugar, unlike the refining of the cane product, is a direct process. To obtain high-grade cane sugar, raw sugar is first made of the juice which is pressed from the cane. The raw cane sugar, in turn, is refined. Our beet sugar industry, however, has no intermediate raw product. The beets literally go in at one end of the factory as they are taken from the ground, except that the tops have been removed, and they leave at the other end in the form of white sugar ready for consumption. The impurities in beets have a disagreeable flavor and must be removed entirely, so that it is not feasible to produce yellow and brown refined grades, like those of the cane refiner.

In planting sugar-beets, the seeds are sown in continuous rows, but after the beets come up they are thinned out to leave intervals of about eight inches. The beets at harvest are plowed out of the ground and, before they are taken to the factory the tops are cut off by hand. They are carted away and dumped into bins, which are so constructed that the beets may be released as needed into a flume beneath. As they float to the factory much of the dirt is washed from them. This cleaning process is completed by machinery, after which the beets are cut into long, thin strips called "cossettes." From these the juice is extracted in diffusion batteries by the simple device of running hot water over them. The pulp that remains corresponds to the bagasse that is left after sugar-cane has been ground. It is refuse and is used only as cattle feed. Since the mixture of sugar and water that has been obtained must be clarified, filtered and boiled, the process of beet sugar manufacture from now on resembles that of cane sugar refining, but boneblack is not used. Centrifugal machines, vacuum pans, granulators—all these have their place as much in a beet sugar factory as in a cane sugar refinery.

This has been a general survey of sugar production as an American industry, and while we have considered sugar in the light of a gift of Nature contributing to the prosperity of the country, it has not been possible for us within the limits of our space to consider at length the many benefits of this commodity to the commerce of the nation. What this enormous trade means to shipping, to the railroads, to the centers of sugar production, to thousands of people who are dependent upon it for their livelihood, to industries that thrive upon its prosperity, and to legions of merchants throughout the land, is something to which we can only allude here.

There are many ships, many railroads, many industries that would be less active were it not for sugar, and yet it is only fair to say that without these developments of modern civilization there could be no sugar industry; no great tropical plantations; no huge refineries turning out from a single plant as much sugar in a day as the whole country consumed in a fortnight one hundred years ago. Acknowledging its debt to the factors that have made large production and wide distribution possible, the sugar industry realizes that its prosperity is dependent upon a cooperation of all the elements concerned, and it never ceases to strive for the greatest possible harmony and for the fullest understanding, not only between itself and the several links of the commercial chain, but more especially between itself and the public which it serves.

Aquarium Fishes and Their Care

By WILLIAM T. INNES

Former President of the Aquarium Society of Philadelphia

(Illustrations from "Goldfish Varieties and Tropical Aquarium Fishes")
(Innes & Sons, Phila.)

THE PICTURE usually in mind when the average person thinks of an aquarium is a small glass bowl containing several goldfish; that these fish are delicate, require constant replenishing, and that the water must be frequently changed to keep sweet. The only grain of truth in the picture is that a small bowl or "globe" *can*, by courtesy, be considered an aquarium. "Fish prison" would be better. The facts are that goldfish are hardy and tenacious of life. In a fair-sized aquarium they should live at least ten years. The water not only does not need to be changed but under proper conditions *should* not be.

Another fact that I want to touch upon now, and develop later, is that the range of aquarium possibilities is by no means confined to goldfish. There can be no doubt, however, that at present the considerable majority of aquarium owners are concerned only with goldfish and how to keep them alive. Therefore let us first go into the practical points along that line.

Like all creatures in the world, fish have to breathe oxygen. Except when water is very hot, it contains free oxygen. It will be recalled how bubbles form in a standing tumbler of water. That is some of the free oxygen which has been liberated. The gills of fish mechanically extract this life-giving element from the water. It is their breath. Without enough of it they soon perish. The supply of free oxygen in a given body of water is limited. As the fish consumes it, where is more to come from? The answer contains the key to most aquarium difficulties, and that answer is, *from the surface of the water*. When the normal amount of free oxygen is depleted from the water by the breathing of the fish, the water absorbs more oxygen at its surface. The practical idea, then, is to have enough air surface to replenish the oxygen as rapidly as it is used. A good general rule is to have about twenty-five square inches (five inches square) to a goldfish an inch long. Two fish would, of course, require twice as much; for two two-inch fish, four times as much.

SILVER MOON FISH, A NATIVE OF THE AMAZON
(Pterophyllum scalare)

This aristocrat of the aquarium moves with dignity, yet is capable of great speed. It is difficult to breed and due to this will remain in the select class for some time.

Usually we find the average unsuccessful aquarium has about one-quarter enough air surface, or four times too many fish, and that the fish are up at the surface "blowing bubbles" as some call it, trying to get oxygen directly from the atmosphere. Under these circumstances a partial change of water is expedient, but success will not be had until either

the number of fish is reduced or the air surface is increased. If fresh water is added, it should

PRIZE-WINNING SCALELESS TELESCOPE

A beautiful fish that would on account of its color and form be an acquisition to any aquarium.

be of nearly the same temperature as the old, and when the water is entirely changed, the new supply should stand a couple of hours to "ripen." Raw water from the spigot

PRIZE-WINNING ORANDA GOLDFISH

Color and form as well as the sweeping fins and tail made this very attractive fish winner of a prize among other aquarium exhibits.

usually contains too much free oxygen, and this also is bad for the fish. It causes bubbles to form in the fins and outer protective mucous covering of the body. When these burst, pockets are formed which make lodging places for the harmful bacteria which are ever present.

Globes should only be about two-thirds filled. This gives appreciably more air surface than when the water is carried near the top. Globes at best are poor apologies for aquaria. They are almost invariably too small, and they distort the appearance of their contents; the larger sizes are liable to

THE CHANCHITO

(Heros facetus)

These are not so savage as other members of the cichlid group of fish. Both parents care for the young, and defend them valiantly.

crack, and they afford scant opportunity for making an aquarium what it really ought to be, a complete minature reproduction of a section of aquatic Nature. In using the larger sizes, say ten to twelve inch, the risk of cracking can be reduced by standing the globe on thick felt or in a saucer containing about a half inch of sand.

Another important help in supplying oxygen is the use of aquatic plants. Under the action of sunlight plants generate oxygen, and what is equally important, they absorb carbon-dioxide which is the chief poison exhaled by all animals, including fish.

One of Nature's greatest marvels is this inter-action of plant and animal

life. In an healthy aquarium where the plants purify the water for the fish, and the breath of the fish feeds the plants, we call it a "balanced" aquarium. While this is perfectly true, we must not expect too much of the plants. When this important principle was first discovered, the claims for it were exaggerated. Some aquarists thought they could overcrowd the fish and depend upon plants to compensate for the lack of air surface. Many correspondents have written me that they have a plant in the aquarium and yet their fish come to the surface to breathe. Now the fact is that plants act beneficially only under the influence of strong diffused daylight or direct sun, and even under the best conditions a single plant can accomplish but little change in the water. When it is remembered that the period of plant activity under sunlight is short, and that there are many dull days and long nights when the fish must go on breathing just the same, the wise aquarist will plan so that his fish do not need to depend upon plant action, but nevertheless he will use them liberally for the good they undoubtedly do at certain periods. Aquarium sand when well filled with growing plant roots is almost sure to be sweet.

TOP MINNOWS
(Fundulus bivittatus)
One of the most graceful of the Killifishes. The general color is reddish brown, flaked and dotted on body and fins with carmine.

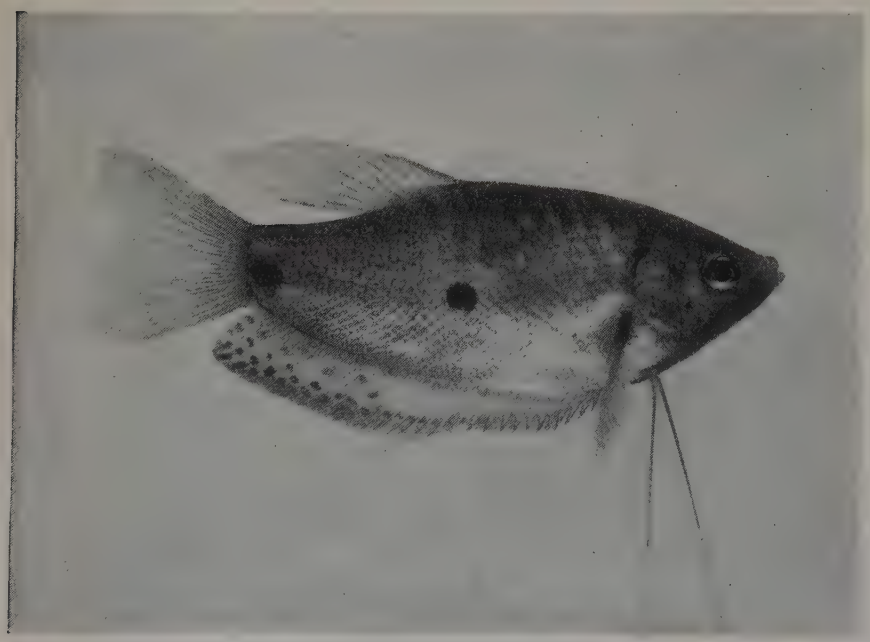
THESE ARE RED HYBRIDS
(Life size)
These are beautiful fish and are very popular for aquarium use. They are frequently all red and oftentimes a very attractive red and black combination.

VIVIPAROUS KILLIFISH
(Belonesox belizanus)
These little fish are quite as bloodthirsty as their expression would appear to indicate. They feed on small living fish.

Many will want to know what are the best plants to use, and where they may be had. The very best plant for general aquarium purposes is *Sagittaria*. The variety known as *natans* is of moderate size. An aquarium of a size 9x15x10 inches high should be started with about a dozen such plants, well rooted in *coarse* sand or grit, one and one-half to two inches deep. They will soon multiply and should be thinned out only when they obscure the fish or encroach too much on their free swimming space. The giant *Sagittaria* is much heavier, and in an aquarium of size

mentioned, two plants would be sufficient. It is better suited to large sized aquaria and is the only one of the popular plants that can withstand the buffeting of very large goldfish without injury or becoming uprooted. *Vallisneria* is another of the truly grassy plants, with narrow, very long leaves, of silky light green. It is adapted only to tall aquaria (at least eighteen inches), multiplies rapidly and is most beautiful, but when thickly grown it presents great difficulties to the man with a net trying to take out a fish.

A NATIVE OF YUCATAN
(Mollienesia petensis)
The male has an extraordinary dorsal development, but the fin is fully erect only in moments of excitement, and the fish is strikingly beautiful.



THREE SPOT GOURAMI
(Osphromenus trichopterus)
Where is the third spot of this very attractive fish? The expert fish fancier says it is the eye which makes the third spot.

Different plants have varying powers of producing oxygen. Those already mentioned are very good in this respect, as is also *Anacharis*. The plant most usually sold in pet stores in bunches is *Cabomba*, or Washington Grass. This is very pretty when new, but is not durable. *Myriophyllum* is also rather weak, but is valuable in breeding goldfish, which subject I will touch upon in a few moments.

Most of the plants mentioned can be collected in the streams and ponds of our country, but unless a collector is experienced, it is best to purchase cultivated stock. Unfortunately there are but few dealers carrying the proper varieties, and it would not be considered good ethics for me to here mention the names of these few. However, anxious inquirers can write (enclosing stamped, self-addressed envelope) to The Aquarium Society of Philadelphia, Twelfth and Cherry Streets, or possibly the Bureau of Fisheries at Washington would forward the information.

A SCAVENGER FISH
(Scatophagus argus)
In the aquarium this fish will take any food and its quaint appearance adds a note of novelty to a collection.

As this is the time of the year when most goldfish breeding is done, a short account of the process will be of interest to many who would like to breed their fish but who have no idea how to go about it. The possibilities for amateur effort are very interesting indeed. Some results can be had with very limited facilities and modest efforts, but the production of strong fish of good quality requires industrious attention and

fairly large tanks. Incidentally, such effort can be made to pay.

Many a spawning of goldfish that could have been made of keen interest is lost to the uninitiated. Where one has three or four healthy fish as long as three inches, kept through the spring and summer, it is reasonably certain they have spawned at least once whether or not their owner knows it. The first sign is when the fish begin "chasing." A female near the spawning time will be chased by all the ambitious males present. This usually occurs intermittently for several days preceding the spawning. The spawning proper usually begins very early in the morning,

EAST INDIAN VARIETY
(Polyacanthus dayi)
Note the more distinct markings and longer fins of the upper fish which is the male.

and is quite a fish circus, the pursuing males swimming most vigorously in their rough and ever moving courtship. A dozen or so eggs are dropped by the female every little while as she splashes over the surface of the water, preferably rubbing against some floating plants. The eggs are about the size of a pinhead and when discharged are slightly flattened. Here is one of Nature's most remarkable provisions: the egg contains a tiny opening or pore and as the flattened egg swells out to its rounded form, it sucks in the surrounding water which has been fertilized by the male fish, and thus fertilizes itself. These eggs are of a pale amber shade nearly transparent, and as the fish soon eat them after spawning is finished, it is easy to see why one could have their fish to spawn and never know it. However, if one is on the lookout and knows what to expect, the eggs are not very difficult to see. From what has been said, the reader will see that some plan to separate the eggs and the fish will be necessary. Spawning usually lasts through most of the forenoon and the fish do not begin eat-

THE GIANT GOURAMI
(Trichogaster fasciatus)
This fish is a bubble nest builder, is very handsome and is particularly brilliant in the breeding season.

A MOUTH BREEDER
(Haplochromis strigigena)
After the eggs are fertilized the female fills her mouth with them and keeps them in her mouth until hatched. During this period she does not eat and so swallows none of the eggs.

ing the eggs until the spawning is finished—at least the males do not, and they give the female little chance to. The best plan when expecting spawn is to have a supply of Myriophyllum or Water Hyacinth plants ready. The fish like to spawn on these, and the eggs are quite adhesive. The plants when well-covered with eggs may be removed to clean water of the same temperature, preferably to enamel trays or basins of good size. Another aquarium or well-seasoned wooden tub or a papier mache tub will do. New wood, copper, zinc or brass are bad for all fish.

The second day a number of the eggs will start to turn white. These are infertile. The fertile ones lose the amber hue and are still more difficult to see, so that the inexperienced breeder is swept by disappointment in the belief that *all* the eggs are bad. If the temperature is about 65 degrees (it should not be far from that), he will be agreeably surprised in about a week to see some tiny dabs of baby fish sticking to the sides of the container. They will stick for a while and awkwardly dash away to another place to which to hang by some strange trick. Within two days they become free-swimming and commence to look for food, which in a state of nature consists of microscopic aquatic animal life coming under the general name of "infusoria."

CLIMBING PERCH "WALKING" ON LAND
(Anabas scandens)
If water in a pond gets low these fish leave it and travel overland to another pond. The fish have air chambers in their gills and are known as lung fish.

A NEWLY INTRODUCED FISH
(Channa fasciata)
A handsome oddity, with dots of silvery whiteness, they have tremendous swallowing capacity and appetites to match. They are air-breathing fish.

MUD SPRINGER OR STONE SKIPPER
(Periophthalmus barbarus)
As the tide recedes these fish come out on the mud flats, stones and even climb little bushes in search of insect prey which they are adepts at catching on the wing.

A few years ago an American scientist, Mr. F. J. Myers, pointed out to aquarists how a culture of infusoria could be had in sufficient quantity for practical purposes of feeding baby fish. The method is merely to place some vegetable matter in water until it decomposes and thus becomes food for the spores of micro-organisms which are present in all air and which naturally fall into the water. Only a small amount of the vegetable substance is necessary, and there is a wide range from which to select. One of the best is lettuce leaves dried, crumbled and spread in a thin layer on the surface of the water. Other substances are pea flour, hay and dried leaves. At a temperature of about 70° it takes approximately two weeks to develop a good culture. A moderate light seems to give the

best results. The organisms flock towards the light and also congregate mostly at the surface of the water. Therefore when examining a drop of the water in order to test it for culture, which

THE MALABAR DANIO
(Danio malabaricus)
The darker parts are a delightful opalescent color verging toward blue and must be seen by reflected light to be fully appreciated.

can be done with any good magnifying glass, take the drop from the surface at the side towards the light. If moving life is perceptible, the water is

THE ELECTRIC CATFISH
(Torpedo electricus)
This most curious aquarium fish, when taken in hand, gives an electric shock which may be clearly felt as high as the elbow. The fish is able to cause the shock either in or out of water.

fit to give in small doses to the young fish. They will do very well on this diet for two weeks. Fish can be raised without living food, but not so successfully. Rice flour or the yolk of hard-boiled eggs strained through fine cloth are the usual substitutes in the first stage.

The second stage with live food consists of daphnia, a small water crustacean about the size of a flea, which is gathered in nets in stagnant pools where there is plenty of decomposition, such for instance as the pools in lots where city refuse is dumped. Fish grow splendidly on this food and even the large fish eat it greedily. In case daphnia is not available, the amateur breeder can substitute boiled oatmeal to advantage. A growing fish will consume the equivalent of its own bulk in a day, but after October is past they should be fed sparingly, and ever after that one must be on guard not to kill fish by kindness—by which I mean overfeeding.

This almost brings me to my next general topic, feeding, but before taking up that subject there

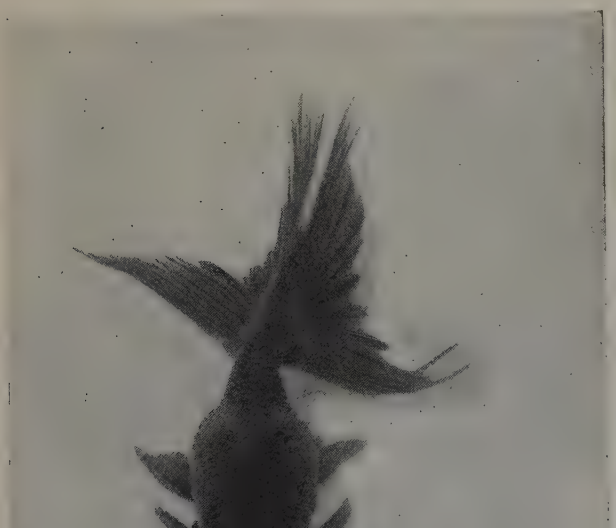
A RARE FISH
(Rasbora heteramorpha)
Difficult to breed, and nobody in the United States has yet succeeded in propagating them. They are light reddish with a vivid triangle of black on the side.

are still a few important things which should be said about breeding. How to tell the sexes is one of them.

I have already said that the pursuer is the male and the pursued, the female. That is a good general rule but it is not always sufficient. In the breeding season the male develops very small white points or tubercles on the sides of the gill plates, and also similar spots on the front edge of the first pair of lower fins, called the pectorals. Except when the markings are unusually pronounced, they are not easily detected by the amateur breeder, but they are usually there in healthy male fish from March until midsummer. Fish without these markings may be taken for females, especially if the body is full and well rounded. If one wishes to make a serious effort at breeding gold fish, the sexes should be kept separate from

February until latter April or early May. Hatchings at this time of the year and up to the end of June are the most successful. When placing the fish together for breeding it is well to use two or three males to one female, and there should not be an idle female present, as she will eat the eggs almost as fast as they are dropped.

For the average amateur who has no extra facilities and who is surprised to find his fish spawning, a spawning net has been cleverly devised to hang in the aquarium, weighted down at four corners. The net is submerged in the aquarium and suspended from the top rim. A good supply of



PRIZE-WINNING CELESTIAL TELESCOPE

This fish is one of the rarest, strangest and most difficult varieties to breed and keep alive.

loose aquatic plants are placed in it, along with the fish, who keep right on with the business of spawning. From this point on the same routine as already described should be followed. The bag merely serves to prevent other fish from eating the eggs, as well as keeping a certain amount of aquarium dirt off them. If fish spawn in an outdoor pool, remove fish after spawning and let nature take its course with the eggs. Feed the young plentifully and do not mix them with the old fish for the first summer, as the heavy feeding for the young fish would be entirely too much for the old. In an aquarium of good dimensions a fish can be brought to a size of an inch or two by November, but in an outdoor tub or pool the growth is at least twice as great. A fish that has been

PRIZE-WINNING SCALELESS TELESCOPE GOLDFISH

This fish won a prize as the best goldfish of any class owned and exhibited. Note the protruding eyes and the long, broad tail.

properly raised should breed at the age of one year. In the breeding of the fancy or toy varieties of the goldfish it is most interesting to note the gradual development of the

DWARF GOURAMI

(Trichogaster lalius)

This is one of the most pleasing of the aquarium fishes except for being rather timid. The male is the brilliant colored one.

different points of form and color, because when first hatched all goldfish look alike. The peculiar developments from the Japanese and Chinese

stock from which we are now breeding are most remarkable. While some of them such as the Comet and Veiltail, express a sense of elegance through grace of line and motion, others, such as the Telescope, with its abnormally protruding

THE SMALL BARBELS
(Barbus semifasciolatus)
These are an excellent aquarium fish usually of a warm silver color marked with black bars or dots. Gentle in disposition.

eyes, the Lionhead with its exaggerated head, express something of the grotesque and weird. Pleading guilty to a perverted taste in admiring such apparent monstrosities, I can only say it is the same kink in the mind which causes many another one to see beauty in an aristocratic Boston Bull or a Pug Dog.

The prices of some of these fancy fish are rather surprising. While the ordinary double-tailed goldfish called the "Fantail" can be had in stores for a dollar or two, the really choice specimens of the leading varieties, sold mostly by semiprofessional breeders, range from ten to twenty-five dollars apiece. Prices from twenty-five to fifty dollars and even higher are by no means unusual.

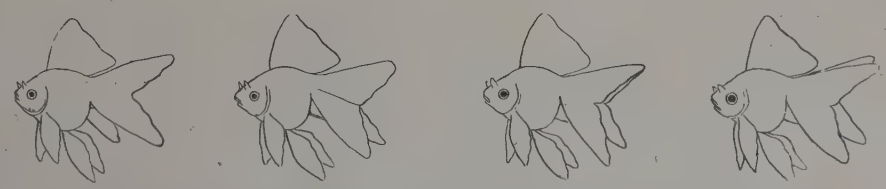
Now as to feeding the adult fish, the main thing is to feed lightly enough. Of those twins, Overcrowding and Overfeeding, it is difficult to say which is the worse. Unfortunately they often work together. Feed only as much as will be consumed in a few minutes. *What* is fed makes little difference, except that earthworms, chopped up, are the best general food. Sometimes they will even bring a sick fish back to health. Goldfish like a variety. The dried fishfood sold in cans in pet stores is a good composite food. They like ground puppy biscuit, bread crumbs, mashed potatoes, bits of boiled fish or shrimp, boiled or raw oatmeal, or, in fact, any cereal. Do not use raw beef. Chopped oyster for an occasional variety is excellent. The little red oyster crabs cut in quarters are much relished. These foods are acceptable to the majority of other aquarium fish except that some of the carnivorous varieties will not take cereals unless mixed with a liberal proportion of animal substance.

In the last few years there has developed a great interest in tropical aquarium fish. About five hundred kinds have from time to time been domesti-

THE FIERCEST OF THE CICHLIDS
(Hemichromis bimaculata)
While the males develop gorgeous colors they are so savage that they attack and kill each other.

cated, but the list of those which really survive, breed and are practicable aquarium pets, is about two hundred. Of these about one hundred are known to the average well-informed tropical aquarist.

Tropical fish have the advantage to both themselves and their owners of being able to live in comparatively small space. Their life habits are extremely interestingly and varied. In a number of species the young are born alive, the families ranging from half a dozen to a hundred or more. In others the young are carried for weeks in the mouth of the mother, while there is a large group of "bubble nest builders," in which the eggs are placed in a floating nest.



EVOLUTION OF DOUBLE-TAIL OR FANTAIL GOLDFISH
Single tail Tripod tail Web tail Double tail

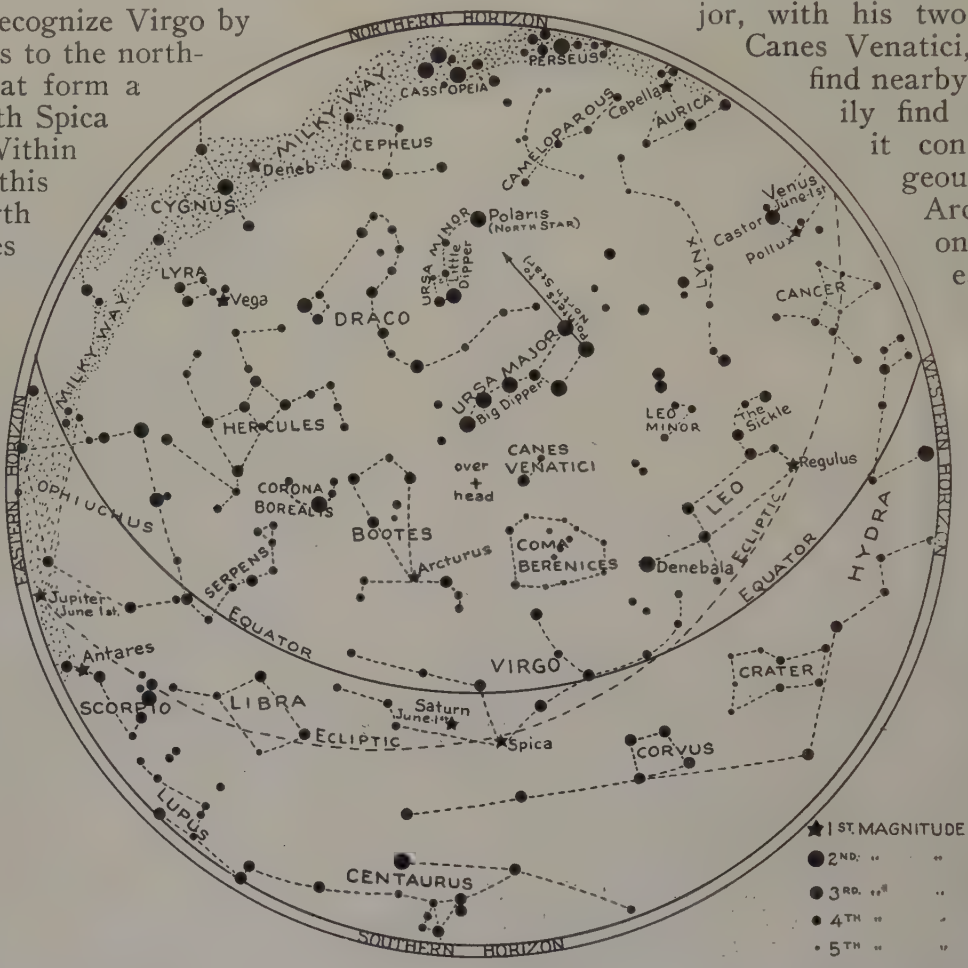
One of the rarest novelties is one in which the female fish leaps out of the water, attaches her eggs on a projection and then both fish splash the eggs

(Continued on page 378)

The Evening Sky in June

By ISABEL M. LEWIS

VIRGO, the Virgin or Maiden, largest of all the constellations that lie in the zodiac or path of the sun, moon and planets, will be found in the southern and southwestern part of the heavens in June. In ancient times Virgo was the goddess of the Harvest and the beautiful white star Spica was the wheat-ear in her hand. We can recognize Virgo by the group of stars to the northwest of Spica that form a fairly good Y with Spica at the base. Within the branches of this Y and to the north in Coma Berenices is a strange region in which are found countless, small, faint nebulae, many of them spiral in form. Even a small telescope will show many of these objects. What they are no one knows for certain but they are believed to be so small because they are at very great distances from the earth. Some astronomers believe that they may be far distant universes of stars.



Coma Berenices, which looks like a misty veil of light, is in reality a coarse cluster of stars. If you look at this group with an ordinary opera glass you will be able to see many stars in the cluster that lie just beyond the limit of vision for the naked eye. Boötes, The Herdsman, is another constellation that lies near the meridian at this time. The Polish astronomer, Hevelius, in the seventeenth century, pictured Boötes as a hunter, pursuing the Great Bear, Ursa Major, with his two hunting dogs, Canes Venatici, which we will find nearby. We can readily find Boötes because it contains the gorgeous orange-colored Arcturus, which is one of the brightest stars in the heavens and a close stellar neighbor of ours, at most not more than thirty-four light years or 200 trillion miles away. We can also recognize the constellation by its peculiar shape, which resembles that of a boy's kite.

Three planets will be found above the horizon at this time, Venus close to the horizon in the northwest, Saturn near Spica in Virgo, and huge Jupiter, the giant of the solar system, now rising in the southeast. Mars is now rising before midnight but is not yet in view at the time for which our chart is given.

The Men of the Trees

This is a story of an African tribe, known as Forest Destroyers, being converted to Forest Planters and Guardians of the Trees

By the Founder, RICHARD ST. BARBE BAKER

KENYA COLONY, which was formerly known as British East Africa, has been chiefly regarded as a happy hunting ground for big game hunters. Many famous sportsmen from America have visited this territory and have added to their collection valuable trophies, while one or two have recently made some of the best films of big game in their natural haunts that have ever been produced. It may be a fact that more is known of the big game than of the native tribes.

Although I know Africa from Cape to Cairo, I have found no tribes more interesting than those of the Highlands of British East Africa. The more one knows of the native, the more one realizes how much there is to be known. The people I have been most recently living with are known as the Kikuyu, and inhabit parts of the Highlands where Europeans and Americans have settled.

Imagine for a moment what a tremendous change has come over the lives of these people. I think I am right in asserting that never has there been a parallel case in the history of a native tribe. A few years ago they were living in constant fear of hostile neighboring tribes—their time very much taken up by tribal warfare, when suddenly a new civilization burst upon them. Civilization was not a gradual process—there was no twilight so to speak; these peoples came right into the glare of the midday sun—they were invaded at once by the latest means of transportation and communication and their progress was speeded up in a phenomenal way. A condition of affairs has actually been reached by them which has taken us hundreds of years to attain. Admittedly most of this is only on the surface. Side by side with this new state of affairs old tribal customs and beliefs still hold sway. The coming of the motor car has not usurped the authority of the Witch Doctor. These people wear charms against infection, charms against accidents, charms for war and even charms for love-making. Sacrifice is made to trees. Sacred trees and belief in ancestral spirits play a very great part in their lives. For instance, when destroying a forest to make a cultivation, often one large tree is left. This tree, the native name for which is Mugumu, is really a parasitic fig tree. It is thought to collect the spirits of all the other trees that have been cut down in its neighborhood and often in times of

THREE THOUSAND WARRIORS PLEDGED TO PLANT TREES

Inauguration ceremony of the Watu Wa Miti (men of the trees) at Kikuyu. Note the white emblem of these builders of the forest, on the trunk of the tree in the background.

drought or famine sacrifices have been burnt and prayers to N'gai (God) offered up at the trunk of a tree of this character.

These same people were formerly known by the name of Forest Destroyers; the reason for giving them this name was that whenever the native wanted to make a cultivation he would go into the forest, cut down and burn the area, plant his grain, reap two crops and then move on further into the forest, repeating the same process of destruction.

Of course, this sort of thing could not go on forever, and the day came when they began to realize that in a little while they would have no fuel with which to cook their food, let alone build their houses.

In many cases I found that their women-folk were forced to go two or three days' journey to collect a few sticks with which to cook their food. Day after day, numbers of the old chiefs and elders of the tribe came together to my camp to talk over the serious situation; night after night they went away quite determined that something must be done, but vaguely knowing how to proceed in the matter.

When I first went into the Highlands of Kenya Colony, I pitched my tent in the midst of the Forest Destroyers and looked out over a country all of which at one time was covered by virgin forest; today apart from a few useless wattles it is bleak and bare.

FOUNDER OF THE FOREST SCOUTS OF KENYA

Mr. Richard St. Barbe Baker, late assistant conservator of forests, with Ching, a tame serval cat and mascot of the Forest Scouts. Ching has traveled 10,000 miles with his master and for the time being has been sent to the London Zoo.

It was to this camp that I summoned 3000 stalwarts of the tribe—all "morans," or fighting men. They came together, summoned by many a horn-blast, and decked themselves out in their war paint, carrying spears and shields as if for battle. At a given signal they fell in by ranks in front of a stadium prepared for such gatherings. Here was my chance. Silence was called for, and in their native tongue I addressed them after the following fashion:

"Men and Warriors of the Kikuyu Tribe, listen well to my words. I have brought you here because a reproach hangs over your heads; in the past you have been known by the name of Forest Destroyers. Too long have you cut down and burned the virgin forests to make your little cultivations without planting up trees behind you. You must all know that this state of things cannot go on forever. Why is it that whenever you want good land you go into the forest to find it? I will tell you. It is because trees improve the soil. Listen well to my words—if you wish to go on finding good soil, you must plant up trees in your old cultivations, so that when all the virgin forest is finished you and your sons will be able to return and find the new forest which you have planted.

"Today I am about to call for volunteers—for men among you who will promise before N'gai (The High God) to plant ten trees each year and take care of trees everywhere. Today the reproach against your tribe must be removed. No longer must men call you Forest Destroyers. Let us rather lead the way, and show other tribes how to plant trees and perpetuate the forests. First I am going to call for volunteers amongst the Chiefs and they will take the name of Forest Guides and enlist their followers in the ranks of 'The Men of the Trees.'"

That day fifty warriors came forward and volunteered to join the ranks of the "Men of the Trees," or as they afterward came to be known—The Forest Scouts of Kenya. Subsequently was added the Boy Scout ideal and promise to do at least one good deed each day. After these first fifty volunteers had been enrolled, every candidate for membership had to be proposed by one of the Chiefs or Forest Guides. Later on an initiation ceremony on tribal lines came into being.

On the appointed day, the colors of the Watu Wa Miti (a white background upon which was an

A FOREST NURSERY IN KENYA COLONY

Here over 80,000 young trees were raised by the Forest Scouts of Kenya, who have been transformed from Forest Destroyers into earnest and active friends and preservers of the trees.

emblem of a green tree) were tied on the trunk of one of the few remaining trees hard by my camp. A square was formed and the Forest Guides took their places in front of their own men. The Master of Ceremonies stood under the tree in front of the colors and asked all present to prove themselves members by showing their left hands, upon which had been tied the badges of membership. The badge of membership is a small brass disc, tied on the left wrist with a "kinyatta" (or small strap) upon which are worked in beads the colors green and white. The Forest Guides were then asked, "Are all present true members?" They looked around and replied, "All present are true members." The Master of Ceremonies—"Is every man's heart 'safi?'" (meaning clean).

Forest Guides—"Yes, every man's heart is clean." Should any member have an unfulfilled obligation, he cannot be said to have a safi heart.

The candidates were then brought forward and warned of the serious consequences of lightly making promises which they would be unable to fulfil, and those who continued in their desire to join the ranks were allowed to repeat the threefold promise: "I promise before N'gai, to do at least one good deed each day; to plant ten trees each year; and take care of trees everywhere." Upon this, the badge of membership was tied on the left wrist with the words, "I tie this on your left wrist to remind you of your obligation. Your right hand is left free to fulfil your obligation."

At this stage the attention of the candidates was drawn to the colors of the Forest Scouts. They are green to remind one of the obligation to plant trees, and white because the heart of every member who comes within the ranks of the Forest Scouts must be entirely clean.

The Chiefs then took their men apart and

SOME OF THE FOREST SCOUTS

Each of these warriors has promised to plant ten trees a year and take care of trees everywhere, as well as to do a good deed every day as the Boy Scout does.

SAVED FROM THE FOREST DESTROYERS

One of the remaining virgin forests in East Africa, Kenya Colony, left after the Forest Destroyers realized that they were depleting a fair and fertile land of its wealth of woodland growth.

gave them the secret sign and password of the Men of the Trees.

At first the idea of doing at least one good deed each day was not readily understood by them, and often towards evening thirty or forty members would come to my camp and say: "Great White Chief, we have come to you to ask you to help us think of a good deed; in two hours the sun will set, and so far we have been unable to think of a good deed to do. Will you help us?" This little difficulty was met by making a forest nursery nearby, where members were allowed to plant out fifty young trees which counted as a good deed. At the same time it was explained to them that this was not necessarily the best kind of good deed to do—they must search their own hearts to find other things which would meet the requirements.

Since these early days, reports have come in from all parts showing that they have grown to understand. Often little deeds of kindness are done—sometimes to a brother native and others to assist maybe a white settler in the neighborhood.

As an example one might cite the case of a settler who was driving in his motor, when he came to a particularly muddy stretch of road. The car, loaded with produce from town, came to a standstill and all efforts to start it proved of no avail. The settler hailed a passing native, who quickly enlisted the help of others. In a very short space of time the car was on solid ground, where it could once again go on its way.

Before driving off, however, the settler offered a tip to the boys who had come to his rescue, but to his surprise and astonishment, one of these young warriors spoke up for the rest: "Sir, please let us off taking 'backsheesh.' We are Forest Scouts, and if we take 'backsheesh,' what we have done would not count as a good deed. Please let us off and we will be happy." The settler was greatly impressed and took the first opportunity of relating to me the unusual and gratifying incident.

Apart from the everyday kindly acts, daring deeds to save life and property have often been accomplished in their desire to fulfil their obligations.

(Continued on page 370)

Friends and Foes of the Wild Flowers

By Mrs. FRANCIS EDMUND WHITLEY

Chairman of Conservation Division, General Federation of Women's Clubs

AT EASTER time the mountains of southern Tennessee were a vision of beauty; the delicate tints of springtime were in the trees, and on Lookout Mountain the dogwood blossoms in their white perfection were like drifted snow against the somber hues of the evergreens.

No wonder that all day long the winding mountain roads were thronged with tourists, we said, for why should not we go out to do homage to loveliness so matchless, so fleeting, just as the Japanese do at cherry-blossom time?

But alas, when we followed the road the next morning, it was with mingled exasperation and humiliation that we realized that our people have not yet reached the level of our little Japanese brothers, in their appreciation of such beauty, for all along the way there were scattered the broken boughs of the dogwood—thrown away, withered almost as soon as gathered, while great branches were broken down and left to die.

All over the land such destruction is going on.

Go to New England where the trailing arbutus, the Mayflower loved by the Pilgrims, used to make fragrant the woods in early spring; now torn up by the roots by hands more eager, after it became a source of profit to florists or street vendors, it has almost disappeared.

The settling up of the country with the advance of agriculture, inevitably drove out many of the wild flowers, but with the almost universal use of the automobile, the destruction has been immeasurably hastened. Especially marked is the devastation near the great centers of population where, on every holiday, come the throngs of motorists

THE LOTUS

Abundant in but very few localities; will not long withstand the present aggression of commercial interests.

whose flights are too often marked by despoiled roadsides and gardens.

As an editorial writer in the *Saturday Evening Post* has said: "It takes a brave man to live in the countryside that is accessible to the city and a hopeful one to beautify the roadside with shrubs and flowers. For the vandals see beauty only to destroy it. Until their morals and manners improve,

Photo by E. H. Crandall

THE TRAILING ARBUTUS

The state flower of Massachusetts has been nearly exterminated from pulling it up by the roots.

the countryman will delegate the pleasure of welcoming them to the bulldog."

Even the shy rare flowers and ferns that once flourished unharmed in their far, secluded nooks are by the motor brought within a few hours distance and fall a prey to thoughtlessness or greed.

For it is not the automobile alone that threatens our wild flowers: this menace is rendered greater by the spirit of commercialism which would strip the last bit of loveliness from our countrysides if it could be sold in the market—and of course the automobile makes the task a simple one.

To the nature lover it is a real grief to see the masses of the fringed blue gentian in the florist's window; he knows how, gathered to the last cluster with no thought of provision for flowers another year, it must soon join the procession of vanishing wild flowers. No longer will its

—"sweet and quiet eye
Look through its fringes to the sky"

to teach its lesson of courage and hope.

One cannot wonder at the resentment of those who see the beauty of the country where they and their fathers before them, perhaps, have made their home, sacrificed thus for the pecuniary benefit of strangers. The dwellers in the southeastern and southern coast states mourn over the destruction of the holly trees as these are broken down year after year, and left, poor ragged stumps, while their branches of shining leaves and berries are offered by the city dealers for the Christmas trade. In the same way the magnolias of the south are being killed by having their thick glistening leaves stripped off to be shipped to florists for use in funeral wreaths.

One cannot wonder that an Alabama woman who loves her state said recently that she never saw a darkey out with his cart, gathering these leaves, without feeling that she hoped that a magnolia wreath would never be placed on her grave if it must cost the life of one of these trees.

Against such an army of destroyers the agencies

Photo by C. R. Shoemaker

THE MOCCASIN FLOWER

Whole plants are sold in the markets for planting, but they soon die from lack of proper treatment.

of education and legislation have been enlisted and the two must go together; a certain amount of educational work is necessary before legislation can be secured and supported, especially when this is in behalf of objects commonly supposed to be of

interest only to the specialist or sentimentalist. There is, therefore, proof of real progress in the fact that any protective legislation for the wild flowers has been secured.

Only think of the derisive or pitying smiles which such a suggestion would have called forth even a few years ago: A law to protect wild flowers! Yet, within the last four years six states have enacted such legislation.

The first wild flower protection law on record is that of the State of Connecticut, which many years ago forbade the selling of the climbing fern, and thereby saved from extermination there that lovely plant. This state now also has laws to protect the trailing arbutus and the mountain laurel. Vermont has a law protecting twenty species, while Maryland forbids the picking of all wild flowers without permission of the owner of the land. California similarly protects the Toyon berry; and Illinois several of the delicate flowers in greatest danger of extermination, such as the moccasin flower and fringed gentian. The latest state to enter the ranks of conservation of wild plants is Wisconsin, which now prevents the sale of the ornamental seedpods of the American Lotus, the trade in which had in recent years been growing to such alarming proportions that it threatened the disappearance of this "queen of the waters," the attractiveness of which is shown by the accompanying photograph.

Photo by A. S. Hitchcock

THE DOGWOOD

Is the most ruthlessly destroyed of any of our native plants, but vigorous efforts to preserve it are now being made.

Photo by C. R. Shoemaker

THE MAGNOLIA

Is having a hard struggle to survive, between the assaults of florists and destruction of its home by real estate speculators.

This recognition of the value of the flowers came after a long and persevering campaign, led by the Wild Flower Preservation Society and the Conservation Department of the Federation of Women's Clubs and other organizations; the services of writers were enlisted; pledge cards, designed by a famous artist, with a decoration of the flowers for which protection was sought were used and a public sentiment was built up which made victory possible.

But though law may be desirable or necessary in dealing with the commercialized destruction of the wild flowers and shrubs, it remains true that law will not be enforced unless there is a public educated to appreciate this outdoor beauty and to perceive the short-sighted folly of allowing it to be wiped out. Whenever by using voice and pen, by persevering reiteration we can make this a part of the common thought it will not be difficult to control, not only the spoliation wrought for pecuniary gain, but the robbing of woodlands and roadsides by thoughtless pleasure seekers.

Welcome the day when it shall be considered "bad form" to come home with a car loaded with the fading spoils of wood and field, since there are so many for whom the Ten Commandments apparently

(Continued on page 379)

President Promotes Love of Nature

President Coolidge wants appreciation and knowledge of the out-of-doors and its recreational opportunities to become a matter of national policy.

He has appointed a committee consisting of Secretary of War Weeks, Secretary of Interior Work, Secretary of Agriculture Wallace, Secretary of Commerce Hoover and Assistant Secretary of the Navy Roosevelt as a Committee to promulgate this policy.

Mr. Coolidge expressed his views in the following formal statement:

"Particularly within the last decade, the outdoor recreation spirit among our people has increased rapidly. During this period there have been put forward projects—federal, municipal, state and private—to expand and conserve throughout the country our recreational opportunities. It is almost idle to emphasize their value to the country. The physical vigor, moral strength, and clean simplicity of mind of the American people can be immeasurably furthered by the properly developed opportunities for the life in the open, afforded by our forests, mountains and waterways. Life in the open is a great character builder. From such life much of the American spirit of freedom springs. Furthering the opportunities of all for such life ranks in the general class with education.

"Our aim in this country must be to try to put the chance for out-of-door pleasure, with all that it means, within the grasp of the rank and file of our people, the poor man as well as the rich man. Country recreation for as many of our people as possible should be our objective.

"Though all are concerned in this matter, the lead must be and should be taken by the national government. Our national government is already concerned in many phases of it, but in an incoherent manner. In the administration of national parks, national forests, wild-life reserves, and unreserved domain, the government holds almost unlimited opportunities for this form of public service. The function of the Federal Government in the construction of highways, in the study of the propagation and protection of game animals, birds and fish, has a very decided bearing upon the recreational facilities open to our people.

"At present outdoor recreation is fostered by state, municipal and private agencies and federal bureaus—the national park service, the forest service, the biological survey, the bureaus of fisheries, plants, public roads, state conservation commissions, and other like agencies. There are also many civilian organizations that impinge on this question, for example, the various sportsmen's associations, containing hundreds of thousands of members and spread through every state, the campfire associations, the boy and girl scouts, the conservation groups and thousands of others.

"In order to handle this matter properly, to adjust the widely separated viewpoints and interlock the interests concerned efficiently, there should be a definite and clearly prescribed national policy. The whole matter, being nation-wide in its scope, demands such handling. The object to be secured should therefore be to promulgate a national policy which should not merely coordinate under federal guidance all activities in behalf of outdoor recreation, but also formulate a program to serve as a guide for future action.

This announcement was followed by the decision to hold a conference in Washington, May 22, 23, 24, to assist in formulating a national program.

President Coolidge, in outlining the objects of the conference, said:

"In general, some of the topics which will be discussed and upon which it is hoped conclusions may be reached and constructive suggestions formulated are:

"Encouragement of outdoor recreation as a federal function; constitutional or legal authority for federal participation; the bearing of outdoor recreation on mental, physical, social and moral development; outdoor recreation as an influence in child welfare; the wild life (games and fur-bearing animals—birds, fish and plants) resources of the United States; the scenic resources of the United States, and major possibilities of national cooperation in promotion of recreation.

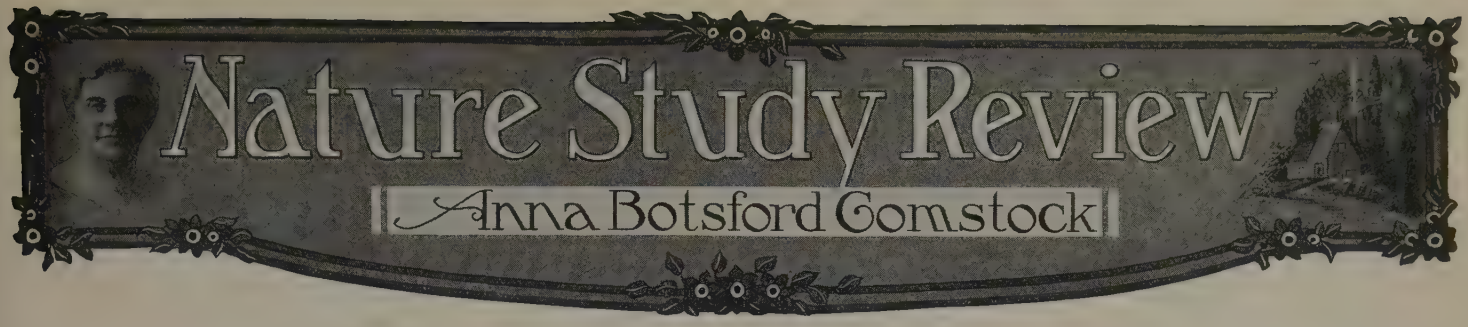
"Under the last-named topic, the following questions will be especially considered:

"Formation of advisory councils on outdoor recreation; closer correlation of work of units of government organization; closer correlation of agencies other than federal, and correlation with federal agencies; formulation of an educational program for outdoor recreation, promotion and coordination of game preservation, and survey and classification of recreation resources.

"This is not an effort to federalize recreation at the expense of state, municipal, local or private interest therein. Individual effort should at all times be encouraged. Many of these interests, however, though working generally toward the same end, do not attain the maximum results because there is no coordination.

"It will be the object of this conference, therefore, to assist in forming a national policy which will coordinate all these activities. The prime objective for which I feel we should strive is to endeavor to make available to the average American outdoor recreation, with all that it implies, and to preserve our facilities for outdoor recreation for our children and our children's children."

The American Nature Association, upon this announcement by President Coolidge, at once offered its services in aiding to carry forward the idea, it being so entirely in harmony with the Association's object: "To stimulate public interest in every phase of nature and the out-of-doors."



How to Become a Naturalist

By VERNON BAILEY

Chief Field Naturalist, Biological Survey, U. S. Department of Agriculture

WE NEED more naturalists in the country, in every state, every university, every college, every school, and every home; need them for a better understanding of, and a better adaptation to, our animate environment, and for the general advancement of the human races. Not all need be or could be professional or highly technical naturalists, but there should be everywhere someone to whom we can turn for reliable information concerning the world of living things with which we live, and of which we are a living part.

The term *naturalist* is so general that it may include the professional naturalists, those who give all of their time to the study of mammals, birds, reptiles, fishes, insects, or any of the many groups of invertebrate animal life down to microscopic forms; or to plants in general, trees, or any other group of plants; or those who merely know the animals or plants, or some group of either in one locality, but know them well enough to be an authority on at least one subject. We might go much further, but for the present purpose the *science of living things* will cover enough of the field. Perhaps the most numerous and useful of all are those unprofessional naturalists who, for their own satisfaction and benefit, have learned so much of the general life about them as to fill their own lives and the lives of others with whom they associate with keen interest and joy of living.

A naturalist should have the background of a broad knowledge of general biology, and the professional naturalist needs today more than ever before the training of higher education, a knowledge of Latin and Greek, a familiarity with modern languages, and especially a good command of his own language, a ready pen and a well-trained voice. Still many successful naturalists have been self-trained men with few educational advantages.

Some will claim that naturalists are born, not made, and to the extent of a naturally inquiring mind, this seems to be true. The real making, however, is a life-long process of study, begun usually at an early age. One lifetime is not long enough to satisfy in its accumulation of knowledge any ardent naturalist, and for this reason, perhaps more than any other, we find gray-haired men and women still fresh and enthusiastic in their lines of study, giving out useful and fascinating facts from the books of life to all around them, up to the very close of their own lives. Such lives often inspire others to follow up similar lines of study, and once started in the field of understanding and discovery, their advance is limited only by time and opportunity.

Most successful working naturalists have begun by making collections of carefully prepared and labeled specimens, and in gathering and preparing this material they have gained a vast fund of useful knowledge, and a training and skill that could not be obtained in any other way.

Flowering plants are attractive and easily collected, pressed, mounted, and studied, but many of the lower orders of plants, ferns, mosses, fungi, and the microscopic forms require and develop the greatest skill and technique.

Insects are so abundant that some are always available and their preservation and study leads to fascinating facts in their life cycles, and to many valuable discoveries of economic importance. Butterflies and beetles are especially attractive to beginners.

Collections of shells, crustaceans, fishes, and reptiles can be made of real and permanent value while one gleans the knowledge of the lives of the various groups and species and of the forces of nature through which they have developed.

Bird and mammal collecting is more difficult and attended by many restrictions, but there are few working naturalists who give much or all of their time to these higher groups who have not

done extensive field work in collecting specimens as well as observing habits. Still it is now possible to study and enjoy a close familiarity with them without taking their lives. This is made possible by the extensive collections already made by other naturalists and used as a basis for our present knowledge of relationship and habits, and for careful descriptions, drawings, and colored illustrations of the great numbers of species at present known.

Usually simple directions are obtainable in book or pamphlet form for preparing and preserving specimens in most of the groups, but the help of older naturalists will be found very useful in the beginning, saving much time and waste of good material. Perhaps NATURE MAGAZINE will some time give brief directions for collecting specimens of different groups of animals and plants.

Labeling specimens and keeping records and data regarding them will test the care, accuracy, integrity, and honor of the would-be naturalist. And right here let it be clearly understood that the *slightest deviation from truth and accuracy, or a carelessness that leaves a chance for error, destroys the usefulness, reputation, and standing of any naturalist.* An unswerving regard for the truth is the religion of a genuine naturalist, and his whole training is to see straight, think straight, and be straight. The rules of the game are rigorous, and the training and self-discipline make for real character.

We need many professional naturalists who give all of their time to investigation, teaching, or writing along some of the lines of biology. In fact, the time is rapidly coming when every child will get some of the fundamental training in the science of living things before completing the grammar school grades, and still more in the high school, and if fortunate enough to have inspiring teachers who will arouse a real interest, will be given a good start toward becoming a naturalist if inclined that way. In future it is to be hoped there will be more farmer, teacher, and doctor naturalists than in the past.

For those who wish to give their whole time to biological work there are broad fields with many well-beaten trails. The greatest number lead to teaching: private teachers of nature classes, nature teachers in the graded and high schools, biology teachers in high and normal schools, professors of biology in colleges and universities, all progressive occupations with opportunity for rising step by step to positions of usefulness, responsibility, recognition, and fairly remunerative salaries.

Museums, of which we have too few, offer occupation to many naturalists, all the way from those who clean skulls and skeletons and mount birds and mammals to curators and assistant curators who care for and study the collections. The character and standing of a museum depend upon the naturalist force which it employs, and of course, to some extent on the endowment or appropriation which supports a well or poorly paid force. Salaries are generally not high, as compared with salaries in business or with what day laborers now receive, so there is little attraction to others than enthusiasts in natural history.

Field naturalists, sent out by museums, universities, scientific institutions, governmental departments, and private collectors to gather specimens and study the habits of numerous forms of animal life have an occupation attractive to many young people, but full of strenuous effort that soon sifts out those not deeply interested. Thorough preparation is necessary, however, before becoming a field naturalist, for one has no time to learn gunnery on the firing line. Every detail of the work of collecting and preparing, cataloguing, labeling, packing and shipping specimens must be at the field naturalist's finger tips, as well as the knowledge that will enable him to keep valuable notes and write up reports full of accurate observations on habits, illustrated, if possible, with photographs or drawings. There is often urgent demand for those who are known to be skillful, rapid, accurate collectors, but the head of a museum or leader of an expedition cannot spend valuable time in training raw recruits in the field.

The United States Department of Agriculture, the Bureau of Fisheries, the Geological Survey, the Hygienic Laboratory, and some other bureaus of the United States Government employ large numbers of specialists in biological subjects; but most of the positions require highly technical training. For instance, the study of the food habits of birds entails the examination of the contents of bird stomachs and ability to recognize or identify the many species of insects from particles of shells, feet, jaws, and wings; of plants from bits of stems, shells of seeds, fruit, or flowers; of small mammals and birds by bones, teeth, hairs, or feathers. In many laboratories it is necessary to know and be able to propagate, control, and test the effects of different kinds of bacteria, the smallest and lowest forms of life, which play vital roles in the economy of our lives.

Forest supervisors and rangers are coming to be more and more naturalists as they find it necessary to know the trees, the forage plants, and the game animals and game birds, and once started they generally go much further in both animal and plant study.

State and federal game wardens must have some

knowledge of wild life and should be naturalists with a real interest in conservation.

Fish culture and fish hatcheries afford employment to many naturalists in both state and federal service, and offer a field of useful and interesting study.

State health departments require a large force of food inspectors and experts in various lines of sanitation where naturalist training and knowledge is required.

Fur farming, raising valuable fur-bearing animals for their fur, or to sell for breeding purposes, affords an attractive occupation, still in its infancy but full of interesting problems in research and investigation.

Water farming, raising food plants, ornamental water plants, flowers, fish, shellfish, turtles, and waterfowl is a little developed industry that has fascinating possibilities.

Park naturalists are a recent adjunct of our great national parks where thousands of visitors go each year eager for information on the wild life that is new and strange to them. Nature guides are greatly needed and in some parks have proved very successful. It is safe to predict that in future the number of these nature guides will be greatly increased if competent persons can be found to fill the positions creditably.

As to what to read, beginners should read about Louis Agassiz, the Swiss scholar who inspired hundreds of American naturalists only one generation back; should read at least his *Methods of Study in Natural History*; *Louis Agassiz, Teacher*, by David Starr Jordan; and for a series of lectures on general biology, *Agassiz as a Teacher*, by Lane Cooper.

Concerning a few of the men who were inspired by Agassiz, and whose teachings have since been an inspiration to other naturalists, read the life of *Spencer Fullerton Baird*, by W. H. Dall; *The Days of a Man*, an autobiography of David Starr Jordan; *Autobiography and Scientific Publications of Joel Asaph Allen*; *In Memoriam, Joel Asaph Allen*, by Frank M. Chapman; *William Brewster: In Memoriam*, by Henry W. Henshaw.

Other good books for beginners are *The Wonder of Life*, by J. Arthur Thomson; *Biology and Its Makers*, by William A. Locy; *Winners in Life's Race*, by A. B. Buckley; *Camps and Cruises of an Ornithologist*, by Frank M. Chapman; *The Voyage of the Beagle*, by Charles Darwin.

Many recent circulars of special significance to would-be naturalists are offered free by the National Research Council, Washington, D. C. Some of these are *Zoological Research as a Career*, by E. C. McClung; *Agricultural Research as a Career*, by E. D. Ball; *Forestry as a Career*, by Henry S. Graves; *Anthropology as a Career*, by Clark Wissler; *Research in Medical Sciences*, by Frederick P. Gay; *The Field for Chemists*, by Wilder D. Bancroft, and others on subjects covering a wide range of interests.

Natural Science and Nature Study in the Schools

THE FOLLOWING is the course of nature study advised by the Department of Applied Education of the General Federation of Women's Clubs, for Grade Six.

It can readily be adopted by a mother as a course in nature study for her children, or can be made the basis for study by any lover of nature.

GRADE SIX

Gardens:

Clean up plot.

Prepare cuttings of grape, raspberry and currants for spring.

These will be distributed in the spring to pupils and later when well started under the care of the pupils will be distributed to the home gardens.

Raise three or four of the plants tried in the community garden of the second grade but now let pupils grow them at home in boxes ready to set out in the spring.

Make cuttings of geranium and begonia for the school window boxes.

Test seed corn.

Plan garden to grow chick food: oats, barley, corn, sunflower.

Get maximum yield. For this project have pupils read state and government bulletins so as to know how best to go about it. See how nearly they can come to a record production.

Toys and Home Appliances:

Make and operate the pin-hole camera.

Try taking pictures and developing plates as a room demonstration to show how it is done. Have children make blue prints of fern leaves, flower sprays, etc.

Set up electric bell or buzzer.

Make dry batteries.

Make and operate electric telegraph.

Make wet gravity battery.

Make an electric motor.

Try electroplating.

Pets and Domestic Animals:

Care of Chickens.—This grade to have care of the chickens as a project.

Studies of pests, lice, mites, rats, weasel; diseases; moulting.

Chicken Project.—Breeds and breeding. Selection of stock for egg-laying capacity. Settings of eggs. The incubator. Feeding for egg production. Care of nests; leg bands. Cost and income accounting. Poultry show.

Correlated Materials:

Bird Migration.—Keep list of birds seen during migration; learn winter retreats, routes of migration, nesting regions.

Trees in their winter condition. Learn the trees already known as you see them in their winter condition.

Forestry.

Birds again. Continue study of migration, keeping lists of birds seen, paying special attention to the water birds, sparrows and warblers.

Locate nests and map.

New location of young birds.

Study feeding of one nest.

Bluebird and woodpecker boxes.

The Giant Cactus or Suharo

By ANNA BOTSFORD COMSTOCK

PLANT species have individuality especially in the impressions they make upon the human mind. The oak is regarded as stately and masculine and the birch as graceful and feminine in all our literature. Thus the Easterner wandering in the deserts of the Southwest, where cacti of many kinds abound, gives involuntary tribute to the dignity of the Giant Cactus and to the impudence of the infamous Cholla.

Much has been written about this pillar-like cactus (*Carniegiea gigantea*) but words do not convey to one who has never seen this species an adequate idea of the impression it makes upon those privileged to look upon it and cultivate its acquaintance. The column has ever attracted the human eye; Egyptians cut obelisks from granite, the Greeks cut fluted pillars from marble, and both have held the admiration of beholders through the ages. Here in the American desert Nature has builded a column as dignified as the obelisk and as graceful as a pillar of the Parthenon, and has builded it of material as firm, exquisitely green and satin smooth as jade. Often the jade column is straight and unbranched, and often it carries stately upturned arms like a giant candelabra, but occasionally there is only one arm uplifted as if in appeal for moisture. Whatever their form, even where some mischance has given individual arms that twist and writhe like plant Laocoöns, they are impressive and although they occur in numbers, yet they seem to embody a sense of aloneness and self repose as do no other species.

The Suharo (pronounced su-war-o and spelled in a half dozen ways) occurs scattered over wide areas on the southern slopes where the desert meets the foothills of the jagged, rough-hewn mountains of Arizona and Mexico; indeed, some aspiring individuals climb the mountain sides for a distance and stand boldly on jutting rocks. In color, at a distance, this cactus is light yellowish green and it is ribbed up and down with sharp angular ridges. On the young specimens and on the branches the ridges, both at apex and base, make acute angles, but on the trunks of the old these are spread to obtuse angles. If a rib is interpolated or dropped out to accommodate the form and size of the plant, the adjustment is made so neatly as to almost escape the eye; when viewed from the tip of the trunk or branch, the ribs seem to converge into star-like rays. These ribs are not mere carven flutings, for each of them carries along its apex, from the bottom to the top of the plant, rosettes of strong spines. Each rosette consists of three or four stout spines an inch or so in length, seven or eight that are less long and strong and eight or ten short ones. The rosettes are greenish when young and vigorous, but turn gray and woody when old, and drop off entirely from the bases of old individuals. They are set so near together that the spines overlap somewhat; but the spines, sharp, strong and smooth, are simply an armor of defense—fair warning to keep off and

Photo by F. M. Campbell

GIANT CACTUS IN BLOOM

The large, creamy blossoms which crown the main stem and branches appear in May.

very different from the insidious spines of the Cholla.

The framework of the Suharo is most interesting. Dr. Forrest Shreve compares the woody tissue to a series of bamboo fishing rods arranged parallel and forming a cylinder. The rods increase in size with age and at the bottom of the plant, they thicken inwardly and, though tapering, form a woody, substantial base to the living column. The fleshy tissue is both inside and outside of the rods and the water content of the two is the same. This water content fluctuates with the seasons, but the plant serenely adjusts itself in volume to these conditions. The roots are extensive, often 50 or 60 feet in length, but they lie near the surface of the ground.

DIGNITY AND IMPUDENCE

On the left the Giant Cactus and on the right the Cholla, another species so prickly that words shy off at the thought of it.

The Suharo grows very slowly. Dr. Shreve has investigated and found that a specimen about eight inches high was twelve years old, and that one sixty years old has only reached the height of about sixteen feet. It is estimated that the oldest living Suharos are 175 years old. They often attain the height of 50 or 60 feet and a diameter of one to two feet; the weight of a full-grown specimen may be 1,700 pounds.

The Giant Cactus blooms in May; the large creamy white blossoms crown the main stem and branches. The flower is tubular and inside the white petals is a ring of many stamens; one flower may contain over 3,000 stamens and one ovary nearly 2,000 ovules. The fruit is oval, about two or three inches long and contains a crimson pulp much prized as food by Pima and Papago Indians.

In passing through a Suharo forest, we note that the older plants are dotted with woodpecker holes and yet few woodpeckers are to be seen. Some of these holes may have been made a century ago, for this cactus protects itself from infection by forming a hard and impervious callous around these nests. Thus from a dead and prostrate Suharo we may lift out one of these nests, entrance hole and all, firmly encased in walls untouched by decay. The skeleton of the Suharo may be often seen standing erect and stately, its parallel ribs bleached white by the sun. These strong bony ribs are sometimes utilized for building purposes by the natives. Thus in death as in life does this remarkable cactus hold fast its human interest, furnishing, after its death, shelter for the human inhabitants of the desert to whom it supplied food during its life.

Photo by C. T. Vorhies

THE GIANT CACTUS

The Suharo, with Palo Verde trees. Note the woodpecker's hole in the tallest one.

The Daisy

By A. A. HANSEN

WHEN THE question of a floral emblem was brought before the last annual convention of the American Legion, it was naturally thought that the Flanders poppy would be accorded the honor with little opposition. But in America the poppy has shown a tendency to become a troublesome weed and to many the bright scarlet blossom recalled bitter memories of blood and carnage. As one popular war poem puts it—

"Poppies?
Not for me, buddy.
Buds o'hell I'd
call 'em
Plain red hell—
they—
They remind me."

"Who wants 'em brung back?" the poet asks, and so the American Legion adopted the daisy as their official floral representative.

But this selection has far from pleased everybody. Extolled on the one hand as one of the handsomest of our common wild flowers, the daisy has been just as thoroughly condemned as a vile and pestiferous weed, unfit for the honor of representing those who fought and those who died for democracy. And so the heated controversy threatens to develop into a roaring flame. Let us learn more about this flower that is causing so much discussion.

THE DAISY—BOTH LOVED AND CONDEMNED

While one of the handsomest of our wild flowers, it is also called by some a vile and pestiferous weed.

The common name is exceedingly attractive; so much so that it has become a very popular name for girl babies in England. The name, however, was originally given to another plant, the English daisy, a different species from the common American daisy. The English daisy is the plant the poets usually have in mind when they sing the praises of the daisy. As the name suggests, it is a "day's eye" in that the flower normally opens in the morning and closes with the setting sun, which is not true of our common American daisy. The English daisy is a dainty little plant, sometimes found cultivated in American gardens but rarely occurring wild in the New World. But pretty as the common name daisy may be, the scientific name, *Chrysanthemum leucanthemum* is imposing to say the least. In the *Chrysanthemum* group are included the common cultivated chrysanthemums of our greenhouses and gardens and the familiar pompon, costmary and pyrethrum of gardens. A wild relative of the daisy is the source of the insect powder known as pyrethrum. The name chrysanthemum is derived from two Greek words and means literally "golden flower." The common name daisy is sometimes erroneously used for several species of wild asters, and black-eyed Susan is occasionally called ox-eye daisy, an incorrect name for this species.

The common or ox-eye daisy, or marguerite, as poetically inclined folks prefer to call the flower, may be found in meadows, pastures, along roadsides and in other out of the way places throughout the agricultural regions of the United States and Canada. The plant attains its greatest display in the eastern states, notably in New York and New England, and is not so common below the Mason and Dixon line or west of the Mississippi River. The species, as with all plants that grow abundantly over a wide area, has a multitude of common names. The poetic name, marguerites, harks back to Goethe's heroine, and many children today pull daisy petals to learn if their ideal "loves me or loves me not." Are there any among our readers who do not cherish childhood memories of telling fortunes by pulling daisy petals? Then there is the common name poorland plant, which alludes to the fact that daisies usually grow in greatest abundance on land of low fertility. Let us not forget the Indian name white man's weed, a name that

owes its origin to the observation of the Indians that wherever the white man settled the daisy followed. This reminds us that the Indian name for common plantain was white man's foot, because wherever the white man trod the plantain seemed to follow.

The Indian was right when he assumed that daisies came with the white man, since the plant is a native of Europe and Asia and was unknown in America until brought over in grass and clover seed by the early settlers. During colonial days daisies were favorite garden flowers but they frequently escaped into the fields. They were well established and grew abundantly in Massachusetts as early as 1783, while in 1815 daisies were purposely seeded in Rhode Island for use as horse feed, since the plant yields fairly good hay. Daisy hay is said to be palatable if the plants are cut and dried during the early blossoming period, before they become old and tough. A study of the chemical analysis of the plant reveals that it has food value practically equal to that of timothy. Has it occurred to you as rather strange that the daisy, a native of the Old World, should make itself so completely at home in its new surroundings in America? As a matter of fact, the worst of our farm weeds were imported from Europe, since our native species have never learned to compete successfully with agriculture as have European plants through centuries of competitive experience. It seems as though European species take on a new lease of life when released on America's hospitable shores, which explains why daisies are far more prevalent in the United States and Canada than they are in their native haunts. Once introduced, the species followed agriculture very closely, spreading by means of impure grass and clover seed and by seed-bearing plants contained in baled hay. The seeds are commonly supposed to be carried by the wind, but since they are not equipped with wings, plumes or any other devices to insure wind distribution, it is doubtful if the seeds are wind carried except possibly during storms and high winds when large pieces of the plant may be scattered about. Once I gathereed some daisy seeds on snow crust and it is possible that they were driven by the wind over the hard surface of the snow.

FLORAL EMBLEM OF THE AMERICAN LEGION

The flower adopted by our soldier boys instead of the poppy which many thought they would choose.

To the uninitiated a daisy blossom is just a flower, but let us examine it more closely. Crumble a blossom upon your hand and you may be surprised to learn that instead of a single flower it was made up of scores of tiny blossoms that were growing closely together. Furthermore, we will discover that there are two kinds of flowers, the white and the yellow, each with its own particular job to perform. The white flowers form the rays and their principal function is probably to attract the attention of flying insects, since the daisy depends upon insects to carry the pollen and so insure cross pollination. Nature, we must know, usually prefers cross pollination and fertilization, since self-fertilization is apt to lead to weakness and sterility. Each white flower forms a single ray, which is popularly called a petal, but as a matter of fact each so-called petal is made up of several (probably five) united petals as indicated by the notches at the tip. The white flowers are capable of forming seeds but they do not produce pollen as do the yellow flowers.

The little yellow flowers that make up the central disc are exceedingly interesting. If we examine a single flower with a strong hand lens or a compound microscope, we will discover that it is made up of five yellow petals united into a gracefully shaped tube crowned by five little teeth, each tooth being a petal-tip. Inside the tube is a ring of stamens and below is the ovary from which a tiny pistil emerges. As the stamens ripen and expose their pollen, the hairy-tipped pistil grows rapidly, brushing the pol-

(Continued on page 380)

How to Teach the Flower

By ADA M. BOYCE

NEARLY all children like flowers, but to like them is not enough; they should learn to appreciate them, and to do this they should know something about them more than merely their names.

I have used a scheme by which children have made an intelligent study of the flowers about them, and very soon were able to look at the blossom as it grew, study its mechanism, understand it, and walk away and leave it alone.

There is so very much more about blossoms than color and form. By studying a few flowers minutely as to the arrangement of their parts, I have learned to see beauty in plants where I thought none existed.

I shall try to give you this method, and I hope you meet with as much success as I have had.

In the note book, a sheet should follow the drawings, telling where the plant lives, its size, color, means of distributing its seed, and any points that can be related about its habit of growth. This sheet may cover an entire season's observation. I know no better line to follow than that given in the "Outline for Plant Study," by the Comstock Publishing Company. It covers the ground so thoroughly.

After the children have dissected—if I may use the term—a few flowers, I would teach them to see the arrangement without taking them apart. You will be surprised how quickly they learn to do it.

The first flowers used for this work should be large ones whose parts are all easily seen, if possible, with the naked eye. The evening primrose is probably the best; moth mullein, spotted wintergreen and apple blossoms are all good.

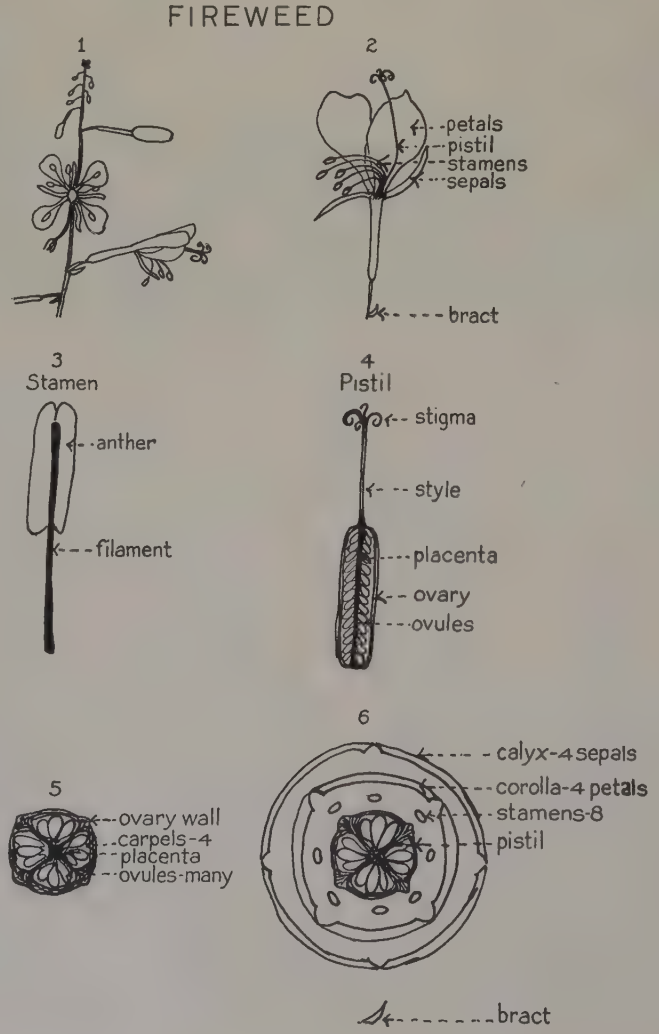
There are a few points I wish to drive home before we do anything at all with the flowers. Report *only* what you see, draw with a pencil very lightly, so it can be erased easily. Next, no drawing is of any worth unless properly labeled, and all labeling should be done by printing with small neat letters. If necessary give a printing lesson first.

The drawings are *not* natural size; they may be many, many times larger than the original flower, but drawing number one usually is about the size we find it in nature, unless our specimen is too large or too small.

The name of the flower is printed near the top center of the page, and the student's name at the right top corner.

Drawing number one is the habit sketch—the flower just as it grows. If it grows in a head, a raceme, an umbel, or singly, show it. There is no labeling on the first drawing at all.

The second is a longitudinal sketch of one flower. Split the flower in half carefully with some very sharp edge, a safety razor blade is about the best, then make this drawing exactly as *you* see it, but plenty large that every part can be seen at a glance. Label all parts to the right of the drawing, using dotted lines with arrowheads to indicate exactly the part meant.



The third, take one stamen very much enlarged, and show distinctly the form of both the anther and the filament as well as the attachment.

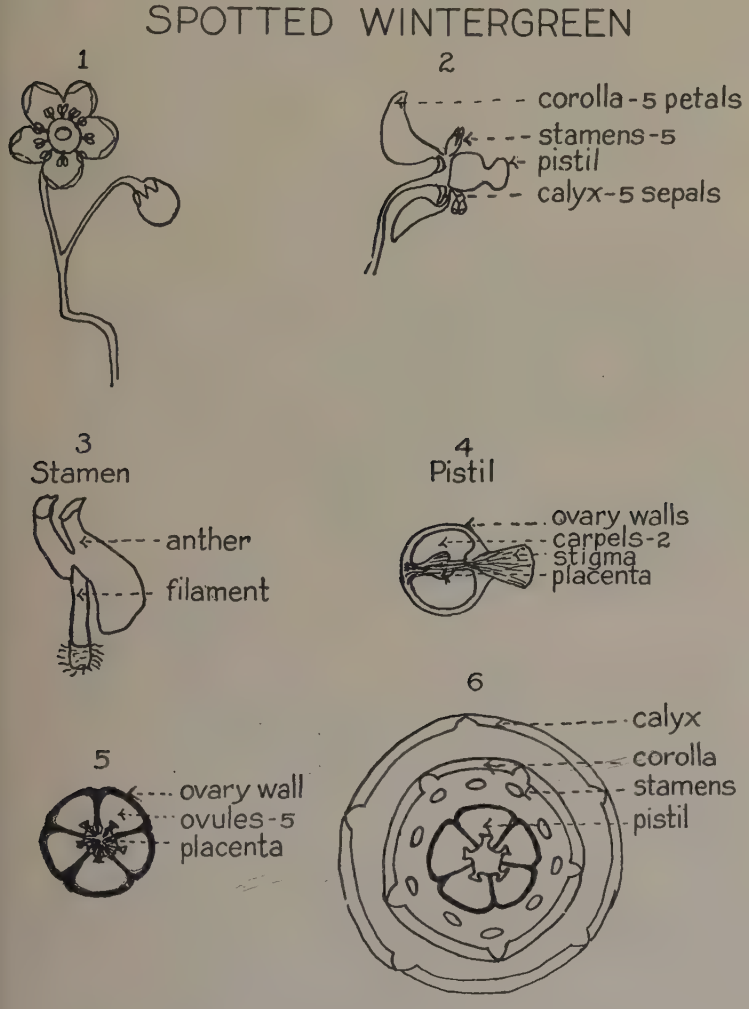
The fourth, split the pistil in half lengthwise, and show the ovules and placenta as well as the stigma, style, and ovary.

The fifth, make a cross section of the pistil. For many flowers it is necessary to have a small hand glass to see exactly. Use double lines to show thickness of walls.

The last drawing, the floral diagram, is the most interesting, and requires more careful observing than the others.

Take a fresh flower, and

viewing it from the under side, note the number of sepals, and on a circle about one and a half inches in diameter, indicate the sepals by a double line. Next inside the sepals comes the petals, and in placing them, be sure you represent them as they really are. If the base of a sepal covers half of each of two petals, show it. If they are opposite the petals, let your drawing show it. The next whorl is made of stamens; count them, and see *just* where they are in relation to sepals and petals. Show the stamens by a little circle or loop. If the



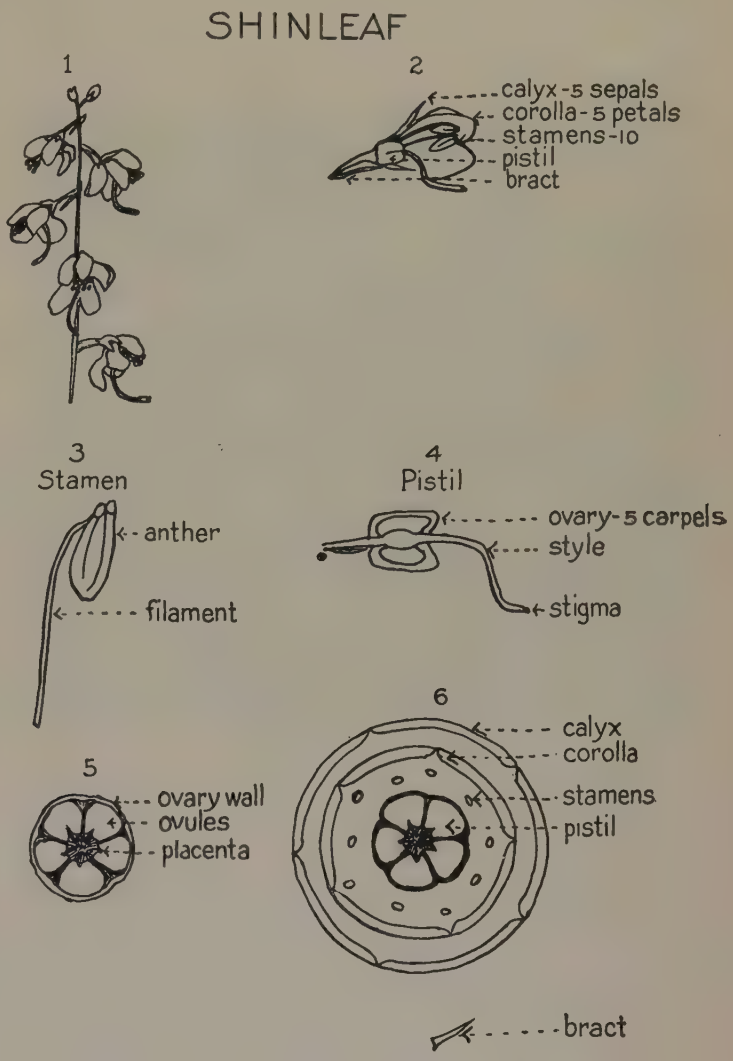
stamens vary in number, as in the blood root, mark it "many stamens."

Inside the stamens place your fifth drawing which is the cross section of the pistil.

Your drawing shows the flower as if sharp shears had been used to cut it horizontally, but left a portion of every part of the flower on the petiole. If it has a bract, indicate it by a small thorn-shaped figure below your floral diagram.

After the children have done two or three easy flowers—but don't forget the violet, which is not easy—I should give them a compound blossom. The dandelion makes a splendid one, and then you learn that probably not one of the class ever thought of it as anything but one flower.

The handglass—I like the tripod best—is necessary for compound flowers. A great help in han-



dling the flower parts can be made by almost any young boy. Whittle a piece of soft pine to the size of a slate pencil, and with a pair of gas nippers, which every automobile carries, insert a short, stout sewing needle, head end first, until it is entirely firm. If the instrument is sandpapered, it adds to its appearance, but not to its worth.

After the drawings have been checked up as correct, ink them in with India ink and a very pointed pen, making all lines fine. When the drawings are entirely dry, use a soft eraser, and clean out any pencil marks which show. I usually do not have any erasing done the day they ink in. There may be a place not entirely dry, and the drawing would be spoiled.

An Intrepid Bobwhite

By HOWARD H. CLEAVES

ONE SPRING I went to Bordentown, N. J., to hunt for birds with my camera. A kindly farmer kept me at his house and escorted me about the countryside. In his woodlot were nesting

NEST BY THE ROADSIDE

The mother quail laid one egg a day in this nest until there were more than a dozen.

many "fish herons" or "quawks," known to bird men as black-crowned night herons. In the center of a cultivated field was the nest of one of our most beautiful plovers—the killdeer—noisy and excitable. Of greatest interest, however, was the nest of a quail or bobwhite. This little brown mother, with all manner of hedgerows and hayfields to choose from, had placed her nest but four or five feet from the edge of a state road along which were passing at frequent intervals many automobiles and farm wagons. The grass and leaves all about were covered with dust from the traffic. But in spite of everything the little bobwhite visited her nest daily to add one more egg to those already deposited. She would not sit on them until all were laid, otherwise they would not hatch at the same time. Bobwhite had about a dozen eggs in her nest when I paid my visit and she may have added several more.

This is only one instance of the way in which wild birds are coming to be more and more trustful of us if we will only conduct ourselves in the right way toward them. Robins, wrens, bluebirds, chickadees, flickers, chipping sparrows and other native wild birds nest in our yards close to our houses and the chimney swift comes down our very chimneys and lives with us in our houses, though some little suspect the presence of these queer birds.

I could not stay to see Mrs. Bobwhite come forth with her big family of brown chicks hardly larger than bumble bees, but I have often thought of the intrepid little mother sitting snugly upon her white eggs while the ground beneath her trembled from the passing of mighty trucks.

The Men of the Trees

(Continued from page 356)

Today there are over 3,000 members in the Kikuyu Tribe alone, and tribes which at one time were suspicious of each other are now exchanging hospitality, all wearing the same badge, having taken the same promises, and belonging to the same brotherhood.

Often at their rallies they indulge in Swedish drill and other exercises, and if occasion should arise to correct a member for slackness, it is generally found quite sufficient to threaten him that if he does not mend his ways he will not be allowed to attend drill the next day.

Often at night time the Forest Scouts amuse themselves by dancing, and when the sun has set and the air gets cool, camp fires are kindled and they stand in picturesque circles and chant weird rhythmic songs of the forest.

The Watu Wa Miti is organized from top to bottom. The organization in a tribe is known as the Forest. The Forest is divided into districts, each taking its name from the dominant species of trees, and these again are divided into branches, each branch being in command of a Chief, who holds the rank of Forest Guide. Hence, the forests, the trees and the branches.

It may not be long before these scouting methods which have already been proven effective in Kenya Colony, will come to be applied in other parts of Africa. Already many of the senior officials are beginning to recognize the movement and lend it their support, knowing that these methods are capable of broader application, and will materially assist in the bringing about satisfactory and beneficial future administration of the natives.

Who Puts the Worm in the Hazelnut?

By DR. LEHMAN WENDELL

BILLY was very much perturbed. He had discovered to his dismay that a great number of the hazelnuts which he had picked a few months previously were wormy. Just how the worms had gotten into the nuts he was at a loss to know. He remembered how carefully he had culled the nuts, throwing away all the bad ones, and yet the worms seemed as numerous as ever. Where could they all have come from? He finally turned to the most reliable source of information—his father.

"So you can't figure out where the worms came from," laughed his father. "Well, it's an interesting story. Perhaps our insect book will give us a clue." Billy's father was an amateur entomologist. He had photographed a great many insects. Then he had made enlargements from the tiny negatives, and these enlarged pictures brought out the queer structure of the insects in such a startling manner that it made them look like strange prehistoric monsters.

HAZELNUT WEEVIL

The insect which puts the worm inside the hazelnut and why she adopts this method of egg laying are described in this article.

He turned one page after another and finally came to the picture of a very peculiar looking creature. It had a chubby body, a small head with two large, bright eyes, and a long, slender snout or proboscis. "This is a hazelnut weevil," he said, "and if it hadn't been for that long snout you wouldn't have found a single worm in your hazelnuts."

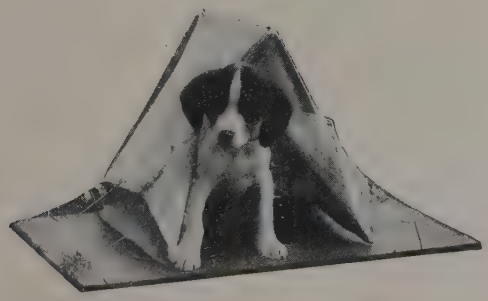
"But, father," remonstrated Billy, "what's that long ugly nose got to do with the worms that I have found in all these nuts?"

"Everything in the world," was the reply. "But don't call it a nose; it isn't a nose at all, but a modification of the mouth parts. Let me tell you the story of the hazelnut weevil.

"In the early fall when the hazelnuts are still green and tender, the mother hazelnut weevil goes in search of a place to deposit her eggs. Instinct has told her that she must find a safe place for her eggs and at the same time there must be plenty of food for her offspring. Now, what better place could she find than the inside of a hazelnut? There her egg can rest safely until it hatches, and the kernel will provide plenty of food for the baby weevil-to-be.

"So the mother weevil begins to peck away at the green nut with the little hook at the end of her snout. In due time she has made a tiny tunnel to the center of the nut; then she lays an egg and pokes it into the tunnel with her long snout. No particular damage has as yet been done to the nut; the wound heals up and the nut continues to grow.

"After a time the egg in the hazelnut hatches into a little white grub like the ones you have found today. The grub begins to feed on the kernel, and when it has developed sufficiently it gnaws a hole in the hard shell, crawls out and drops to the ground. It now wraps itself up in a silken cocoon and goes to sleep. While asleep a gradual and wonderful transformation takes place and when the grub finally wakes up it is a full grown weevil which you would find very much like its mother."



NATURE NEWS AND VIEWS

Practice What You Preach

A dollar means a whole lot to a member of the United States Forest Service, but there is more than one member who is willing to risk his hard-earned dollars in practicing real forestry. These men have from time to time purchased cull second growth timber on their own account or in partnership with friends, and they are satisfied that their investment is proving quite as valuable as the statements of the Department of Agriculture endeavor to prove. On the other hand, there are men in public life who for years have been preaching conservation of natural resources who have not, themselves, invested one cent in the practical application of their theories. The alibi that for political purposes they do not think it wise to be personally interested in natural resources now receives little credence.

Courtesy of J. V. Darling, the Cartoonist

We do hope the wild flowers appreciate how ardently we love them.

Smith College Pushes Nature Study

To have the fields and woods for a classroom, flowers and ferns as texts, and an entire summer in which to study is the privilege of the young women who take the new course instituted by the department of botany at Smith College. The purpose of this course is to foster a better knowledge of summer flora. After preliminary instruction in the spring, each student is required to prepare during the summer an herbarium of at least one hundred flowers and ferns accurately named. So interested were the eager botanists who took this course last summer that they spent many hours out of doors in their work. Their enthusiasm aroused the interest of their families, who aided in the search for botanical lore. Credit for one year hour or two semester hours of college work is granted for successful completion of this course.

A National Park Museum

The Museum at the Yosemite National Park is being conducted in such a way as to stimulate and develop interest in all Sierra wild life. Through the good cooperation of visitors, it is now a veritable storehouse of information on nature and Indian lore. Eventually, it is to contain a representative of every plant, mammal, bird, fish, reptile, amphibian and invertebrate animal native to the Yosemite. We hope these specimens may be so exhibited and simply described that their examination may be profitable to even the least assiduous visitor.

Making Young Conservationists

One of the most notable achievements in arousing sentiment in support of conservation of natural resources has been made by Mrs. Charles Cyrus Marshall, Chairman of Conservation of the New York City Federation of Women's Clubs. Anticipating Conservation Week, which is always the first week in April in New York, Mrs. Marshall offered to each public school in the city two prizes for the best compositions written on conservation topics, including forestry, wild life, national, state and local parks, water power, potable water and stream pollution. These prizes were subscriptions to NATURE

MAGAZINE, copies of "Trees as Good Citizens" and "The School Book of Forestry," by Charles Lathrop Pack, and copies of "Minds and Manners of Wild Animals," by William T. Hornaday.

The result that came from this offer was a total of about 25,000 essays on conservation. Forestry was the most popular subject, Mrs. Marshall says. She adds that "some essays brought in all the subjects mentioned and many essays showed a splendid grasp of the relation of one resource to another." In addition to the enthusiastic response on the part of the students, Mrs. Marshall received equal evidences of enthusiasm and appreciation from the teachers. The principal of one school expressed the sentiment of many when, writing to Mrs. Marshall, he said: "The compositions were written from the children's point of view and have the charm of sincerity. They were a revelation. We thank you for the fine idea. It has proved an inspiration to us all."

The marked success of this first big effort to spread the gospel of conservation in the public schools is expected to result in its being an annual movement.

A Three Hundred Year Struggle

There is an ancient fir tree on the Rocky Mountain side in Glacier National Park of Montana which, experts say, shows evidence of having battled with the elements for its existence for three centuries. Each winter the huge snowdrifts from the mountain tops crush the tree to the earth, and the short summer season leaves it but little time to strive for its natural perpendicular form. The trunk, 12 inches in diameter, lies along the ground but grows, nevertheless.

Outings for the City Dweller

The New York chapter of the Adirondack Mountain Club publishes a program of outings for each season of the year, well in advance. A schedule is made up, showing just where the party is to meet and by what trains, cars or ferries the destination may be reached. These well-thought-out weekly schedules of well-conducted trips represent the splendid growing interest of city dwellers in the great out-of-doors. One has but to accompany the party on two or three trips to realize that the environs of the greatest city in America are still rich in natural beauty and variety of wild life.

Nature by Radio

A British broadcasting company has tried the experiment of placing microphones in groves frequented by the nightingales and thus relaying their songs to every part of the world. American listeners with instruments capable of hearing England will have the opportunity to make the acquaintance of this poetically famous bird. The *Bangor News* suggests that a natural plan of reciprocation would be for the American transmitting stations to broadcast the song of our mocking bird which many persons consider superior to that of the nightingale. Future developments in radio may result in familiarizing everyone with the songs and cries of wild birds and animals, the sounds of wind and wave and other characteristic noises of nature.

Parks for All the People

Delegates from all parts of the country and from the majority of conservation organizations are expected to join in the Fourth National Conference on State Parks to be held at Gettysburg, Pa., from May 26 to 28. The importance of the conference is suggested by its object, which is "to urge upon our governments, local, county, state and national, the acquisition of land and water areas suitable for recreation and preservation of wild life, as a form of the conservation of our natural resources, until eventually there shall be public parks, forests and preserves within easy access of all the people of our nation." Judge John Barton Payne, former Secretary of the Interior, is chairman of the conference.

Predicting Forest Fires

The Forest Service of the United States Department of Agriculture is cooperating with the Weather Bureau to study fire weather prediction in the Appalachians. The courses of storm movements which cause protracted dry periods are being mapped in order to serve as a basis for the prediction of high fire hazard. This collection of statistics should enable the department to indicate well in advance the approach of a dry and, therefore, dangerous season. Extra guards may then be placed and proper precautions taken. This is in line with the practice frequently pursued on the Pacific Coast of Canada where many lumber camps cease all woods operations during the assured dry season of July-August. This shutting down is not compulsory but is felt by these lumbermen to be in their own interest.

An Invitation to Mountain Climbers

The organization known as The Cascadians located at Yakima, Washington, is issuing invitations to join in their fifth annual outing, which will be held August 3 to 17 on Mount Adams, the second highest peak of the Cascade Range in Washington. The wonderful east side of this mountain is distinguished by three tremendous ridges, two great canyons and four big glaciers. Here is the veritable home of the avalanche, and visitors may be sure of seeing several of them daily. On most snowpeaks avalanches are a diversion; on Mt. Adams they are a business. Every variety of mountain climbing, ranging in difficulty from the kindergarten of Alpinism to the most appalling rock work, may be found in one day's trip from the permanent camp. It is interesting to note that all the literature of this organization bears such slogans as "Prevent forest fires; it pays" and "Leave a clean camp and a dead fire."

New England Take Notice

The United States Forest Service maintains that white pine planted on the Biltmore Estate in North Carolina twenty-four years ago is making a slightly better growth than natural stands of the same age in New England. For instance, on sample plots in the Pisgah National Forest in North Carolina yields of 5,000 cubic feet to the acre are being compared to an average of 3,000 cubic feet for similar stands in New England. This increased growth is attributed to the equable climate of the southern mountains which allows the trees a longer growing season.

Substitutes for Chestnut Trees

The chestnut blight, which has been sweeping our native chestnut out of existence throughout the southeastern states, has resulted in experiments to introduce foreign species which will be blight resistant. Extensive experiments along this line have been conducted in the Pisgah National Forest of North Carolina by the United States Forest Service, and the Chinese chestnut, Chinquapin, another important species, was planted in selected seed beds. Unfortunately, these trees have apparently been more susceptible to frosts than our native hardwoods, and this condition seems to indicate that no solution of this important problem has as yet been found.

Speed of a Fox

"I once had an opportunity to measure the speed of a fox," says Charles Wendell Townsend in his book, "Beach Grass," published by Marshall Jones Company. "As I was motoring along the road one evening at Ipswich, with searchlights burning, a splendid red fox bounded ahead of the automobile, his white tail-tip glistening like a target. He was evidently confused by the lights and darted first to one side and then to the other side of the road, but finally, after a run of about two hundred yards, he turned in to the bushes on the left. In following the chase I had speeded up to thirty miles an hour, but did not gain on him. I have found, by measuring the tracks of another bounding fox, that his feet spread out in a line to a distance of three feet, and that the distance between the jumps was five to seven feet."

Join the tree-planting army and celebrate the centennial of Arbor Day in 1972 by planting trees now.—CHARLES LATHROP PACK.

"The Tree Planting Army"

***THE PART OF GOOD CITIZENS**—A people without children would face a hopeless future; a country without trees is almost as helpless; forests which are so used that they cannot renew themselves will soon vanish, and with them all their benefits. When you help to preserve our forests or plant new ones you are acting the part of good citizens.*
—THEODORE ROOSEVELT.

EVERY state in the Union, Alaska, Hawaii, the Philippines, and a half dozen foreign countries are represented with membership in the American Tree Association. Have you joined? The only way to join the tree-planting army is to plant a tree and register it with the Association in Washington, D. C. The Douglas Woman's Club of Douglas Island, Alaska, is the most recent applicant for membership.

* * *

The Roads of Remembrance plan for making the great motor highways memorial roads planted with trees in honor of the men who answered their country's call in the World War has been taken up by every transcontinental highway. From Topeka the work along the Victory Highway is being pushed. Many registrations of tree planters have come in from the Old Spanish Trails. The work is being organized in every town along the Bankhead Memorial Highway.

* * *

In Nashville, Tenn., the Kiwanis Club is backing a movement to plant 30,000 memorial trees.

* * *

Edwin Wilbur Rice, D.D., Litt.D., honorary editor of the American Sunday School Union, who did his first tree planting eighty years ago, has just joined the tree planting army.

* * *

The Columbus Federation of Women's Clubs is planting a memory mile along the Sciota Trail out of Columbus, O.

* * *

Mrs. John Clapperton Kerr is directing the work of memorial tree planting in Riverside Park, New York City, and has registered 27 trees with the American Tree Association.

* * *

President William Wallace Campbell of the University of California has just become a member of the American Tree Association. The Rotary Clubs of San Joaquin County, Calif., have completed memorial tree planting along the Lincoln Highway in that county.

* * *

Through the Ohio Federation of Women's Clubs the national tree voting campaign of the American Tree Association is being put on in hundreds of schools throughout the state.

* * *

Posters made for Forest Protection Week by pupils of the South Hills High School of Pittsburgh, Pa., have been sent to Mrs. Mary K. Sherman, chairman of the department of applied education of the General Federation of Women's Clubs, for exhibition at the biennial convention in Los Angeles.

* * *

T. C. Luther of Mechanicsburg, N. Y., is the champion tree planter of the country. He plants from three to five hundred thousand seedlings every year.

Under the direction of J. L. Perron, Minister of Roads, tree planting is being done along the Montreal-Quebec Highway.

* * *

Women's Clubs of Mississippi have just completed a statewide competition in tree planting.

* * *

At Hoboken the Lions Club will make Eleventh Street a memorial avenue by planting trees.

* * *

Daughters of the American Revolution of New Hampshire are joining the tree-planting army following a statewide tree-planting drive.

* * *

Eight hundred memorial trees have been planted near Birmingham, Ala., along the Bankhead Highway in honor of the soldiers of Jefferson County.

* * *

Nature study pupils of the Sacramento, Calif., schools were the first to register for 1924 in the tree-planting army.

* * *

The Woman's Relief Corps Department of the Potomac has planted a tree for Clara Barton on the Lincoln Memorial grounds in Washington. The first college tree planted on these grounds was placed by Mrs. Calvin Coolidge for Oberlin College.

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MR. and MRS. S. L. FREESE
Boys 7-11, 12-15. Box N 15, Waltham, Mass.

Taking Pictures of Moose and Deer

(Continued from page 331)

toward us. We rapidly paddled toward them, hidden by a wooded shore, and landed on a small grass-covered island which they would surely pass. I crawled on my hands and knees to the shore and hid behind some tall grass and got into position ready to get their pictures. As the water was shallow, the cow fed rapidly with the calf tagging behind. When she got within about seventy-five feet she turned and climbed up on the little island on which I was hidden. I peeped back and there stood the big black cow away above me and apparently looking down at me, not fifty feet away.

I found out afterward that the moose had a regular path across this island to the dead water below, and if she had followed this, she would have passed within eight feet of me. I recalled then that a cow moose with her calf was apt to be peevish with strangers and also that if she struck out with one of her big forefeet, it would smash one's chest like wet tissue paper.

It seemed to me that the next move was distinctly hers, and I remember curling myself into a little ball like a caterpiller, hoping for the best. However, luck was with me, for after standing there for an interval which seemed mighty long to me, she wheeled around and went back into the water again and walked toward me. Again I was out of luck, for if she continued along the shore, she would have come within about five feet of me, and no picture would be possible. I was then, so to say, attacked by land and water. Most fortunately, however, Seely, who was in the canoe, about fifty feet away, recognized the situation and stood up. Instantly she stopped just twenty feet from me and stiffened in her tracks, while the calf ran behind her for protection. A picture was snapped and away she ran, never having seen me at all.

On trips like these one is not always successful in getting close-range pictures, but he always has the thrill and excitement of the chase and has, in addition, the mental and physical rest which a vacation in the North Woods gives him, and he looks forward with joy to the next summer when he can try it all over again.

Yankee Doodle-Dude

(Continued from page 337)

it? A marmot. Go carefully and you will see his greyish-yellow body sitting upright beside his hole. Those strange querulous bleats as from a beast of size—they come from the diminutive throat of that tiny mouse-like pika-hare. In the cottonwoods, fields and canyons near the ranch we hear and see what may be to us strange new birds—magpies, horned larks, and even perhaps a water ousel.

The father of dude ranching was known

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Indispensable to every outdoor man. Small enough to carry in pocket or belt, yet large enough to fell a tree. Tool steel blade, carefully tempered and sharpened; drop-forged metal handle, hard rubber side plates. Nickel-plated guard is spring-hinged and lead-lined. **No. 2,** 11-in. handle, 2⅜ x 4-in blade, **$3.25. No. 3,** 11½-in handle, 2½x4⅜ in. blade, **$3.50.**

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You can't afford to take a trip without a Marble's Compass. Waterproof screw case. Absolutely accurate. Can't demagnetize, **Safety Coat Compass,** fastens to coat or belt, stationary dial, **$1.50:** revolving dial, **$1.75. Pocket Compass,** stationary dial, **$1.25;** revolving dial, **$1.50.**

If you can't get Marble's Outing Equipment from your dealer's, we will fill your order direct.

Send for our 1924 catalog.

Marble Arms & Mfg. Co.
569 Delta Ave., Gladstone, Mich.

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Reproduction from a painting of the estate of Wm. H. Vanderbilt, Newport, R. I., by Sigurd Skou

Your trees may be suffering from the unfavorable conditions of last year

THE long and excessively dry period of last summer did serious damage to many trees. Some of your trees may have dropped their leaves prematurely; on others the leaves may have turned brown and curled up. Some trees started to die back at the top; on many others the leaves turned to a sickly yellow—indicating a reduced vitality.

The heavy freezing in the late spring of 1923 killed many trees outright; on many others it sprung the bark and left open wounds to decay. In still other cases the tender growing tissues were injured and the growth stunted.

The tree is a living thing—it is just a big plant. Its food must be taken largely from the soil; it requires above everything abundant water. Anything which injures a tree sufficiently to reduce its vitality makes it much more susceptible to disease. Ill health in trees is just as dangerous as it is in every other form of life—it is very often a mere preliminary to death.

Davey Tree Surgeons are very much more than mechanical experts; they are trained in the science of tree life. Some trees are too far gone to be saved, but countless thousands of valuable trees can be saved by these master Tree Surgeons—if not neglected until it is too late.

Let Davey Tree Surgeons examine your trees carefully without cost or obligation on your part. Davey Tree Surgeons live and work regularly in your vicinity—any place between Boston and Kansas City, or in California. Write or wire nearest office.

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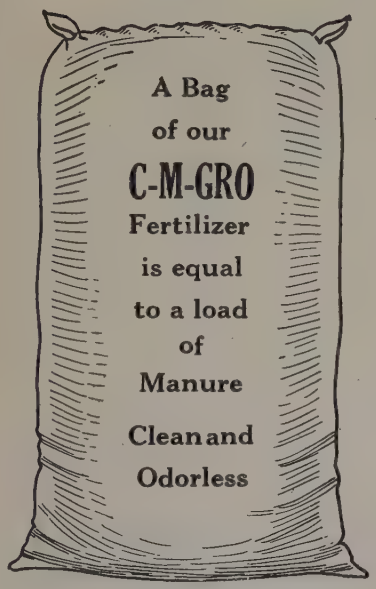

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to many of us. "Uncle Howard" Eaton he was to countless "dudes" who knew and loved him. He invented "dude ranching" and gave it its name. Dude ranching has its bard and historian in the person of Mary Roberts Rinehart, and thousands annually read her books to wish themselves back again on the ranch or on the trail through one of the National Parks. Just as Buffalo Bill stood out as a hero of the old west, so Howard Eaton has stood as one of the founders of the new, and to his memory today there are hundreds who have learned to sing:

If you've breathed the air of her vales and hills,
If you've watched her peaks in the gloaming,
If you've filled with pride as her horsemen ride,
Then you'll join in this toast To WYOMING.

Aquarium Fishes and Their Care

(Continued from page 351)

with drops of water to keep them moist until hatched, this procedure being a protective plan to keep the eggs out of the reach of aquatic enemies.

One of the most extraordinary is the German bitterling. As spawning time approaches the female develops a long oviduct or tube filled with eggs. This she inserts in the mouth of a fresh water mussel. As might be expected, the mussel closes and thereby squeezes the eggs into its own shell, where they hatch, safely protected from all enemies, and doubtless feeding for a time before emerging on the juices of their unwilling host. Space in this article allows but a little touch on this big and fascinating branch of aquarium study.

Another branch which I am pleased to note is receiving well-deserved attention is that devoted to native fish. Of these there are many suited to the aquarium, and not the least of pleasures in this connection is that derived from collecting them. Most states permit the use of seines for catching bait fish, and as aquarium specimens are of the bait size, it is usually safe to collect this way, especially if the collector is particular to throw back all fish not needed. Just one word in this connection, don't "hog it" and try to carry too many fish home. They are all likely to suffocate on the way.

The majority of small fish can be acclimated to the aquarium and will make interesting pets, the habits of different species making an endless source of study and entertainment. Carnivorous species, such as bass and pike, are hardly worth trying. Sunfish also have a tendency to be destructive. They often pick at the fins of other fish and invariably destroy water snails which ought to be kept in the aquarium as scavengers. For this purpose the common pond snail is the best.

With the native wild fish the same gen-

eral rules apply, give them plenty of room and be stingy with the food.

If any aquarium fish show signs of droopiness, or has a whitish scum on the body, or a reddish, congested appearance to the fins, it should be immediately removed to another receptacle containing a mild solution of bathing salt—just strong enough to be faintly salty to the taste. Feed little or nothing, and as a rule the fish will be better in a few days. Do not under any circumstances place a sick fish in strong salt water. Also remember, please, not to suddenly change the temperature on any fish, sick or well.

Friends and Foes of the Wild Flowers

(Continued from page 359)

have less binding authority than the magic formula: "It isn't being done!"

After all our greatest hope for the future lies in educating the children, the citizens of tomorrow. In this, as in other movements, "progress marches on the feet of the children."

Many are the plans which have been employed for enlisting their interest; nature study as a part of the public school curriculum ought to make it easier and in many state already credits are given for this subject.

In others efficient volunteer aid is rendered by enthusiastic nature-lovers, club women and others in educational talks which help the children to know the value of birds and flowers and lovely growing things. They cooperate with the teachers in presenting plays and pageants on some nature theme in which the children impersonate the flowers and trees. A play of this kind has been given in New York City and its suburbs, over and over, under the leadership of the conservation chairman of the City Federation of Women's Clubs, and thousands have heard the appeal, thus charmingly presented, to preserve something of the beauty of our country.

The exhibits held by the Wild Flower Preservation Society, by the Federation of Women's Clubs and others have also been very helpful in educating public sentiment. Two years ago a most remarkable Nature Exhibit was given in Marshall Field's great retail store in Chicago, in which various outdoor organization cooperated, under the leadership of the Federation Conservation chairman; there were the forest trees, the real log cabin, headquarters for the Boy Scouts; there were hundreds of nature posters and birdhouses done by the children of the public schools; there was the automatic projector which all day long showed to the thousands of people who, during the week, saw the exhibit, the pictures, beautifully colored, of the wild flowers of that locality with the accompanying plea for their protection.

A gentleman watching the crowds pointed

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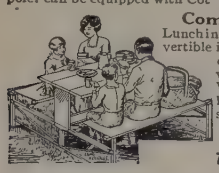

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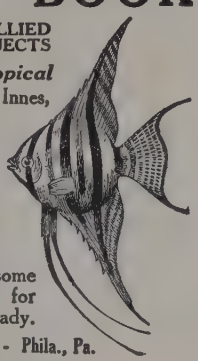

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to a slide just being displayed, which bore the words: "Spare the wild flowers for the sake of others who will enjoy them as you have done," and said, "How much impression will that really make?" "Not much on you, perhaps, but it will stay in the minds of those children!" for all day long, serious-eyed children were gathered there, drinking in the lesson of the flowers.

Perhaps there is no more effective method of initiating the boys and girls into the fellowship of the flower-lover than is found in the "hikes" which are such a valuable part of the nature work of the Boy Scouts, the Girl Scouts, the Camp Fire Girls and others; they learn to know the growing things by name, to enjoy them without destroying. They learn which of the flowers are so vigorous and capable of taking care of themselves that they may be picked freely, like the goldenrod, the daisy and others.

Many children's librarians, as well as teachers, are doing splendid work in training up protectors for the wild flowers; one of them has been giving badges of honor to the children for proofs of interest.

There have been, recently, signs of an awakening of the public to the importance of conserving those natural resources which, as Theodore Roosevelt said, years ago, "Underlie the future prosperity and happiness of our people." May we not hope that while our citizens are considering with new seriousness the dangerous consequences of permitting these to be wasted, they may not forget that we have been given a marvelous inheritance of natural beauty which also may be neglected and lost.

And however great and powerful our country may become, we shall leave it immeasurably poorer to our children, if through our indifference it is robbed of its heritage of winding tree-shaded streams, lily-studded lakes, cool woodlands broidered with flowers and giving shelter to the birds—all that outdoor beauty which keeps alive what is noblest in the soul of man.

The Daisy

(Continued from page 367)

len ahead until the golden pollen grains are pushed into the open, ready to be carried away by an insect visitor in quest of food. After its job of pollen-pushing is finished, the tip of the pistil forks into a pair of branches, the branches become sticky and are then ready to receive pollen brought by a flying insect from another plant. And thus cross pollination is accomplished, vigorous seed is produced in astonishing numbers (about 5,000 seeds per plant) and the daisy goes on its merry way, delighting the eye and pestering the farmer. No self-sterility or weakening here! As though to add to its vigor, the roots live in the soil year after year, sending forth new shoots every spring. It is for this reason that mowing alone will not subdue weedy daisies.

I have frequently been asked questions

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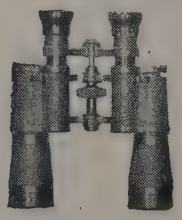

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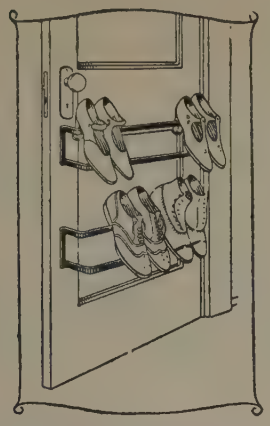

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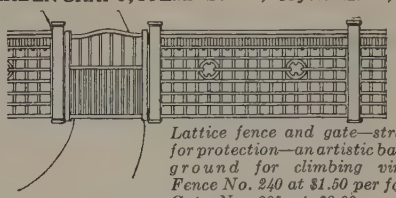

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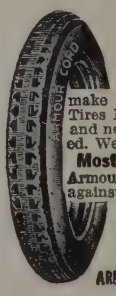

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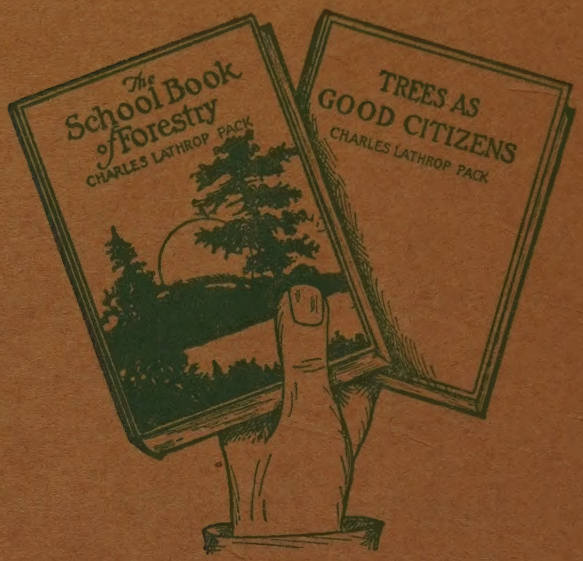

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